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THE FLEXIBILITY OF ELECTRICAL ADVERTISING.

Extended observation of present tendencies in electrical advertising leads to the belief that in more senses than one a brilliant future lies before this branch of the industry's work. The time is coming when every advertising expert will recognize electricity as one of the most potent tools at his command, and when the small merchant and the national dealer alike will rely upon the electric sign, the automatic display and the motor-driven exhibit, as a matter of course. We are little more than at the beginning of such work, judging from some recent examples of the remarkable effectiveness of electrical advertising, which deserve particular comment.

The moderate cost and availability of long-distance telephonic service, for instance, were admirably illustrated at the recent Boston Electric Show by a large colored map of New England in which a movable strip of cloth, passing an illuminated window on the step-by-step principle, displayed the price of a three-minute conversation between Boston and about a hundred cities successively indicated by glowing miniature lamps. The device was in principle the acme of simplicity, although the working out of the mechanical and electrical details of its operation was a problem of considerable difficulty. The display was constantly surrounded by a crowd of interested people, and as the cost of operation was trifling, the results were bound to be secured in a most efficient way. Perhaps the most striking feature of the display in connection with its flexibility was its arrangement with terminals fitted to permit the transfer of the entire exhibit to any other important municipality in the New England Telephone & Telegraph Company's territory, and its immediate setting up for continuous operation with the proper order of figure displays and lamp lighting to show the rates from that city to the other points covered in the field of service.

Another striking display was arranged in the form of a coal-mining scene in a Southern state, in which miniature dump cars and trains run by electric power illustrated the methods of handling fuel between mine and breaker, classifying pockets, and the tide-water markets. For work of this kind the small motor is invaluable, and its cost of operation and first cost are both so reasonable that the exhibitor cannot afford to be without it if he wishes to use the most up-to-date methods. In this connection a prominent central

station has found that much good has come from the display of a miniature factory driven by a small motor on the group plan, the outfit being shown at food fairs, industrial exhibitions and at special office "at homes," to the great edification of non-technical visitors. The operation of models of the human figure by small motors offers another suggestive line of working to the advertising expert anxious to popularize new designs of toilet articles. The coming Christmas season will afford an opportunity for more electrical advertising than ever before, and the safety, economy, and convenience of such methods should lead to their use on a scale surpassing past efforts, to the mutual profit of the merchant, the electrical supply dealer and the central station.

CENTRAL-STATION POLICY.

Enterprising central stations in this country have long realized the necessity of cultivating good relations with their customers and of developing the good will of the community. While there are still some public utilities which cling to the attitude which Mr. Vanderbilt made famous by his remark, "The public be damned!" this has become rather uncommon among central stations.

Upon logical grounds one might expect this friendly attitude to be more prevalent among municipally operated plants, but the evidence at hand does not seem to support this conclusion. Even in England, where the municipal plant is the rule, the attitude of the management has not been generally one of especially courteous treatment or a consideration for the welfare and best interests of the consumer. The spirit which actuates this attitude is, however, growing and spreading, and in a recent address at the East London College upon "Management of Electricity Supply Undertakings," Mr. A. H. Seabrook, who has charge of one of the most progressive stations in England, made a plea for giving the consumer a square deal. He maintained that the central-station manager should use every effort to give the customer full value for his money, and even show him how he could save money by the proper utilization of current, and in settling complaints be willing to go more than half way. While there may be some individuals who will try to take advantage of a broad-minded policy of this kind, it is better to have the large majority well satisfied than to be certain of not losing something to the dishonest few.

This gospel contains nothing new to the American manager, but it is well to give these matters periodical consideration and make sure that not only a definite policy exists in the mind of the managing officers, but that every employee of the company is imbued with the same spirit. The public judges a company by the conduct of those employees with whom it comes in contact, and every effort should be made to have each employee keep prominently in mind and give regular expression to the policy of the company.

CO-OPERATION WITH THE CONTRACTOR.

Closer co-operation between the central station and the wiring contractor was a dominant note at the convention of the New England Section of the National Electric Light Association in Boston. There is nothing new, of course, in the recognition of the fact that the contractor is one of the best solicitors that the central station can acquire, and that he is in a position to throw a large amount of new business at practically no expense to the local distributing company. But the Boston discussion showed that the practice of cutting prices on wiring and apparatus by the central station is in some quarters a troublesome feature of the situation, and the point was also made in Mr. Addis's paper, which is abstracted in this issue, that the contractor does not always do his full personal share of the work of installation, thereby raising the cost of each job above the price which could be made if that much discussed individual should put on overalls and get into the fray with bit and screwdriver on his own account.

A clear-eyed survey of the situation in the contracting field discloses little cause for any permanent alarm on the part of either the central station or the contractor. No hard and fast policy can be laid down for all conditions, but fundamentally the central station is in business to sell electricity rather than current-consuming apparatus, and its chief concern must be the acquisition and retention of customers for its service. There is nothing wrong in the sale of apparatus by the central station at the regular retail prices, and if a company considers it good policy to do wiring at such prices, there can be no fundamental objection so long as price cutting is not indulged in to the detriment of the contractor. Here is where the need of co-operative agreement enters. At the Boston convention several managers expressed the opinion that the day of special concessions to introduce apparatus had passed, and contended that the public ought to be willing to pay a reasonable profit on both wiring and devices consuming energy. In many towns, however, the public will not do this until the habit of using electric service has become general among many classes of people, and in such cases it may be necessary to make a concession whose cost shall be borne by the central station and paid over to the contractor as an expense properly associated with the development of new business.

These are the lines along which co-operation tends to accomplish good results. At Worcester, Mass., for example, a low-cost house-wiring campaign has worked reasonably well at a cost to the householder of about $6.00 per outlet, the jobs being divided among the local contractors in rotation. The large amount of work done as a result of the central station's activity has given the contractors a good deal of work at the cost of little time and expense in developing the field. We are inclined to believe that

prices for such work may properly be made somewhat lower during special house-wiring campaigns than all the year through, as the existence of a reduced, but limited, rate for such work tends in every case to create new business through the desire of the public to take advantage of a bargain. Certainly if a company reduces the price of apparatus temporarily, it cannot expect the contractor to continue in the field unless the advantage is shared with him. Such sharing is a perfectly legitimate expense associated with new-business development and should be accounted for as such.

THE BENEFITS OF CONSOLIDATION.

In his address this week to the Chicago Section of the American Institute of Electrical Engineers and the Electrical Section of the Western Society of Engineers at their joint meeting, Dr. C. P. Steinmetz elaborated the idea of the consolidation of electrical supply systems under a common management with generating stations of large capacity, explaining the various items of advantage and economy. Since the paper by Mr. Samuel Insull before the American Institute in New York City last April, this idea has been receiving considerable attention, and it may, indeed, be taken to represent the trend of future developments in the supply of electric power.

In the old days when the value of service was considered by the managers of many public utilities as the proper basis for the charge for supplying such service, and when this basis for prices met with little opposition, it is probable that the economies resulting from such a consolidation of small operating electrical companies would redound entirely to the benefit of the promoter who succeeded in bringing together the various interests involved, with, perhaps, partial sharing of these benefits with the holders of the securities of the companies. Such results have been apparent in the combinations of large industrial operations into the much berated trusts, such as the Standard Oil Company, the United States Steel Corporation, etc. While much stress has been laid upon the benefits of this form of co-operation and the resulting economies in management, sales and industrial production, the fact that these benefits are enjoyed by a few rather than by the public at large has led to a persistent and insistent clamor against these trusts.

In the field of public utilities, however, the proper basis for the fixing of charges to the consumer is becoming widely recognized to be the cost of the service rendered, and in states where the rates are regulated by public service commissions it is to be confidently expected that the consumer of electric power will share in the benefits to be derived from the economies incident to the consolidation of small plants into large systems. Since the actual cost of furnishing power can be reduced in this way, it will be impossible for the banking houses handling the financial arrangements, or even for the investors whose capital is involved, to appropriate the entire benefits. Public utility commissions have shown their disposition to prevent any watering of the stock of public utility corporations in the future, and without this element in the consolidation the way will be open for the consumer to benefit by the results.

At the meeting addressed by Dr. Steinmetz this question was raised in the discussion by one who appeared to think, from the history of industrial consolidations, that little advantage was to be gained from such consolidations except by those manipulating the deal, and that consequently there would be under such conditions just as much if not more justification for the operation of isolated plants than at present. In states where public service commissions have control of such consolidations as well as of the rates, there is little occasion to fear such results, and with the added advantages of the central station company forming part of such a large system, the isolated plant may be expected to gradually become a matter of history, except in few exceptional cases where particular conditions make it more advantageous.

CHRONOMETERS AND ELECTRICAL EQUIPMENT.

The increased use of electrical apparatus upon the modern ship has, according to *Steamship*, resulted in serious disturbance to chronometers. The hair springs of chronometers have generally been made of steel and in some cases the balance wheel contains a portion of this ferromagnetic metal. The period of oscillation is, of course, affected by any force which may act on it in addition to those of elasticity and inertia, upon which its isochronous motion depends. When a conductor carrying an electric current is placed in the neighborhood of such a chronometer, the magnetic force exerted upon its moving parts may alter its rate. If the conductor is near and the current is large, this effect is not only a very real one but may become very serious.

The hydrographer of the British Navy has called upon the Magnetic Department at Greenwich Observatory to help solve the difficulties which have arisen in naval vessels. One of the curious results of the investigation which was undertaken was the discovery that a chronometer in the vicinity of a magnetic field is not affected when its balance wheel moves through an arc of 210 degrees.

In place of endeavoring to render the magnetic effects of no importance to the action of the chronometer, it would seem decidedly better to avoid the use of magnetic material in the construction of the instrument, at least in those parts which influence the rate, namely, the balance wheel and the spring. There would be no difficulty in eliminating steel from the former, but in the latter it is a serious matter, as there are few materials having the necessary elastic properties to exercise this function. However, the existence of a nickel-steel alloy which is non-magnetic should offer a possible solution of the problem.

Problems Connected With the Gigantic Electric Power Systems of the Future.

The first of this season's joint meetings of the Chicago section, American Institute of Electrical Engineers, and the Electrical section, Western Society of Engineers, was held on the evening of October 28 in Fullerton Hall of the Art Institute, Chicago. As has been customary for many years, the inaugural address was made by Charles P. Steinmetz, the title of his address being, "Some Problems in Electrical Engineering."

Dr. Steinmetz took up the consideration of those problems chiefly which would arise with the development of the gigantic electric power systems of the future. He discussed at first the influence of load-factor and diversity-factor in the high efficiency and economy of large generating stations supplying the greatly diversified energy demands of many classes of consumers. Large systems can afford to have high-class experts in charge of each department; these men must be leaders of their respective arts. The economy and progressiveness of the large systems will bring about their extension so that each will cover a large territorial area bordering on that of adjacent networks. The next step will be interconnection of these networks so that they will cover the entire country like our present system of trunk and local railroads. These gigantic systems should be given the rights of condemnation, etc., granted to our railroads and like them should be under the general supervision of some interstate commission to prevent unfair usurpation of power.

For the transmission and distributing networks there will probably be several classes of feeders and main lines. Power feeders operated at generator voltage will supply transformers for the 2,200-volt alternating-current distribution and substations for the conversion to 600 to 220-volt direct-current railway and dense mixed load; the more distant substations will be supplied by 20,000 to 30,000-volt transmission lines; the still more remote distribution centers will need 66,000-volt transmission lines. The very long cross-country lines may be operated in the neighborhood of 150,000 volts; these will serve chiefly as tie lines between large adjoining networks and normally will not carry very heavy loads, unless they connect a water-power development with an important load center. Dr. Steinmetz considered that for the most part the largest generating stations will probably remain near the large cities.

Under present conditions the load-factor of a gigantic power system of large territorial extent would probably not exceed 50 to 60 per cent. The problem, therefore, will remain of filling out the valleys of the load curve. This will require the reorganization of many industries so as present better individual load-factors. Dr. Steinmetz showed how the railway industry had evolved and how it may be changed to utilize electric power most economically, despite the tendency to follow old ideas even under radically different conditions. Other industries were considered and it was pointed out that the electrical engineer would have to take up these problems of reorganization.

Dr. Steinmetz concluded his address with a consideration of the relative reliability of water power and steam power and of the relative need for continuity of service of various classes of consumers.

Central Association of Science and Mathematics Teachers.

The twelfth meeting of the Central Association of Science and Mathematics Teachers will be held at the Northwestern University, Evanston, Ill., on Friday and Saturday, November 29 and 30. The Great Northern Hotel, Chicago, has been selected as headquarters for out-of-Chicago members and friends.

The addresses at the general sessions will be given by W. C. Bagley of the University of Illinois and Carroll G. Pearse, superintendent of public schools, Milwaukee, Wis. They will discuss some of the important phases of present-day educational problems.

The programs of the five sections contain the names of many of the prominent educators of the Middle West and provide for many reports and discussions of a practical nature which will prove of great interest and value to teachers of science and mathematics. The secretary is C. E. Spicer, 100 Sherman Street, Joliet, Ill.

City Improvement Work.

At the regular weekly luncheon of the Colorado Electric Club held at the New Rex Café on October 24, A. L. Fellows, engineer for the City and County of Denver, addressed the members on "City Improvement Work." He outlined what city improvements meant to a municipality such as Denver.

Philadelphia Section Illuminating Engineering Society.

The regular monthly meeting of the Philadelphia Section of the Illuminating Engineering Society was held at the Franklin Institute on Friday, October 18, at 8 p. m. At the dinner preceding the meeting, which was held at Hanscom's Restaurant, there were 30 members and guests present.

The meeting was called to order by the chairman, Professor Rowland, there being about 85 members and guests present. The papers of the evening were "Physiology of Vision and Causes Other Than Defective Illumination for Eye-Strain," by W. Zentmayer, and "Tests for the Efficiency of the Eye Under Different Systems of Illumination, and a Preliminary Study of the Causes of Discomfort," by C. E. Ferree. Those taking part in the discussion were Messrs. Calvert, Macbeth, Serrill, Ives, Regar, Bond, Ely, Israel and Hare.

The Faraday Magnet.

It is claimed that the most powerful permanent magnet in existence is one made by Michael Faraday for the international exhibition in London in 1851 and now in the possession of the Royal Institution.

Electrical Exports for July and August.

It has been customary in these columns to give a monthly summary of the electrical exports of the United States. These have been based on data supplied by the Bureau of Statistics of the Department of Commerce and Labor, Washington, D. C. On July 1 of this year a reorganization of that department took effect which places all matters relating to the compilation of import and export data under the Bureau of Foreign and Domestic Commerce. Coincident with this change there have been numerous changes in the classifications, among these being several that affect the electrical exports. Formerly these have been subdivided into electrical appliances and electrical machinery. Below are given the data for July and August, 1912, according to the new classification. It will be apparent at once that detailed comparisons with the corresponding month of a year ago are impossible, although the total exports can be compared.

Articles.	July, 1912.		August, 1912.	
	No.	Value.	No.	Value.
Dynamos and generators	.....	$184,841	.....	$204,608
Motors	.....	203,262	.....	281,200
Fans	3,724	40,488	1,962	24,637
Arc lamps	492	9,307	670	26,069
Carbon-filament lamps	96,940	14,288	84,024	10,765
Metal-filament lamps	84,140	27,441	122,305	38,960
Telegraph instruments (including wireless)	.....	39,559	.....	23,840
Telephones	.....	113,626	.....	92,523
All other	.....	1,299,857	.....	1,398,159
Total	.....	1,932,619	.....	2,100,761
Total, July, 1911	.....	1,291,929	.....	.....
Total, Aug., 1911	.....	.....	.....	1,391,689

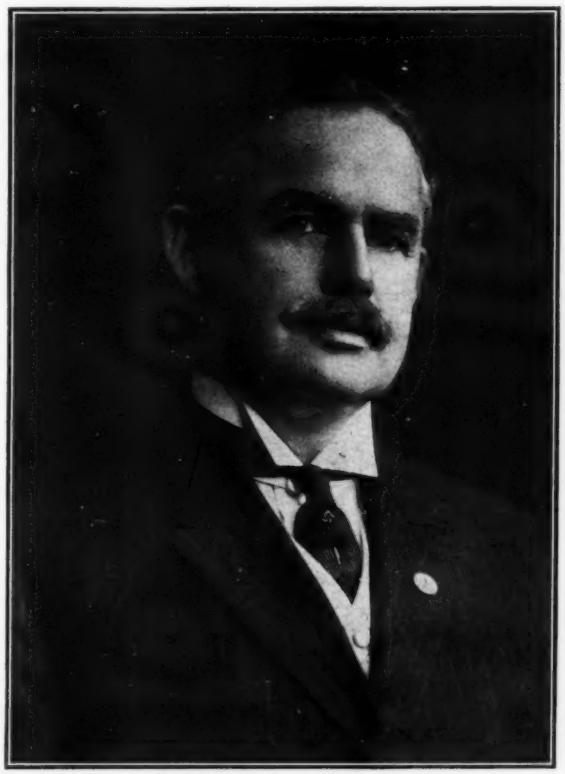
Robert L. Jaynes.

To few men has it been given to accomplish within a period of a short year so satisfactory a record of work well done as that which crowned the efforts of Robert L. Jaynes, Tenth Jupiter of the Order of Rejuvenated Sons of Jove. When Mr. Jaynes was elected Jupiter at Denver, in October, 1911, the Order numbered approximately 4,000 members, there was a deficit in the treasury, and the outlook for strenuous work was such as might have brought some degree of fear to a heart less courageous and a mind less active. The situation in the Order was not in any way a matter for disparagement with regard to the preceding administrations. A great deal of faithful and intelligent work had been done, and it was the good fortune of Jaynes to be the chosen one at that psychological moment when everything tended toward a greater degree of fraternalism and cooperation upon the part of the entire electrical industry. There was a big opportunity and the man was there to grasp it.

At the close of the tenth administration a few weeks ago, the membership had increased to something over 8,000, a substantial appropriation has been made for the Past Jupiters' endowment fund, a liberal expense has been undertaken for the rehabilitation of paraphernalia, and a good deal of money expended for improving the routine of the office and rendering an increased service to the members through the medium of the Jovian Bulletin. Notwithstanding these extra expenditures, there was a handsome balance in the treasury at the end of the fiscal year. Jaynes says that he did not do this work himself, and gives the credit for the organization and development that has been brought about during the past year to his faithful band of statesmen and statesmen-at-large, to the Past Jupiters' Association and the tenth congress. In a great measure this is true, and this is giving credit where credit belongs, the efforts of Ell C. Bennett, Tenth Mercury, in support of the work of Jupiter being such as to draw forth the commendation of everyone having any knowledge of the great work that Mercury had accomplished.

But Jaynes was more than popular. He had the confidence and esteem of the Order and unremittingly kept at his statesmen for a good report, and through the efforts of his immediate constituency in Pittsburgh brought out a number of rejuvenations which established a record and gave the other cities of the United States something to emulate and something to strive hard to excel.

Mr. Jaynes has been an active member of the Order for the past six years. In 1911, as statesman for the Pittsburgh district, he brought 260 new members into the Order. Early in life he became an electrician and for a number of years he has resided in Pittsburgh, establishing the Robert L. Jaynes Company, representing a number of prominent lines of electrical manufactures. He is a member of several of the state and national electrical associations, and a member of the Pittsburgh Athletic Club. While he makes his business home in Pittsburgh, he is the owner of a large stock farm at Fredericksburg, Va., where with his sister and his two fine, lovely daughters, he is wont to go for rest and recreation.



Robert L. Jaynes,
Tenth Jupiter, Rejuvenated Sons of Jove.

Boston Vehicle Club.

A luncheon and meeting of the Boston Electrical Vehicle Club was held Wednesday afternoon, October 23, at the Hotel Thorndike. About 35 members were present. This was the first meeting held after an interval of several weeks, the intermission being due to the unusual tax on the members' time, attendant on the Boston 1912 Electric Show.

After the luncheon President Day Baker called the meeting to order, and Frank J. Stone, chairman of the committee on making the club self-supporting, reported recommendations as follows: that there should be a membership fee of $5.00 where one member represents his concern, with a $3.00 membership fee for additional members in the same firm, the latter to have full voting power. Semi-monthly meetings were also recommended.

These recommendations were adopted, and the following officers for the permanent organization were elected for one year: President, Day Baker; vice-president, E. S. Mansfield; secretary, H. F. Thomson; treasurer, J. S. Codman; executive committee, the above officers and F. N. Phelps, Morton J. Fitch and Frank J. Stone.

After a discussion as to the best means of insuring as large an attendance as possible, serving the convenience of city as well as out-of-town members-to-be, it was decided to leave to the Committee on Meetings the matter of selecting the dates and the hours for holding the club's gatherings, together with the method of assessing members for the price of luncheon. It is hoped to enlarge the scope of the Club's membership to include members from a radius of perhaps 15 miles around Boston. E. S. Mansfield cited the large projects which the New York organization of a similar character has in view, and urged that the members of the Boston Club "get into the game and dig."

Dayton Branch of Rejuvenated Sons of Jove.

A branch of the order of the Rejuvenated Sons of Jove is being formed at Dayton, O., by Marion W. Nichols, of the Will & Hall Electric Company. Contractors and all branches of the electrical industry, students at the Y. M. C. A., teachers of St. Mary's College, electrical engineers and specialists are eligible for membership and already a considerable number have been enrolled. The officials of St. Mary's College are desirous of increasing the electrical facilities of the institution and make it an electrical school of importance, and they are heartily co-operating in the formation of this branch.

VALUE OF OFF-PEAK LOADS.

Discussed by Commonwealth Edison Section N. E. L. A.

The last 1912 meeting of the Commercial Division of the Commonwealth Edison Section, National Electric Light Association, was held in the rooms of the Western Society of Engineers on the evening of October 24. Two papers were read, one by Alex D. Bailey, assistant engineer at the Fisk and Quarry Street Stations, on the "Value of Off-Peak Loads to Central Station"; the other, "Factory Lighting," by M. H. Flexner. Nearly one hundred members of the Section were present, and the success of the evening was added to by the excellent character of the music furnished by the Company Section Orchestra under the direction of Mr. Eastman.

In opening his paper Mr. Bailey explained the common misunderstanding of load-factors applied to central stations. This is brought about by the fact that there are several methods of figuring the maximum, the question being as to whether this should be the maximum load the station is capable of sustaining for a short time or continuously. The latter method is used at present. With this explanation as a starting point the author took up fully the load conditions existing in the Company's station.

The value of filling up the valleys of the load is, of course, recognized. This is shown by the active manner in which flat irons and other heating devices are being pushed by various lighting companies and the inducements that are offered to produce off-peak loads and increase the loads of present off-peak users.

Curves that were shown by the author demonstrated very well the difference between the load curve existing in summer and that existing in winter. This state of affairs necessitates some investment which is at present used in winter and can be profitably used in summer; an off-peak feature which is often overlooked.

The extremely rapid rate at which the load of a station increases in the morning and evening and the equally rapid rate at which it falls off, necessitates putting boilers into service and taking them out very rapidly. This is one of the factors that makes it so very desirable to do away, as far as possible, with rapid variations. The frequency and voltage must, of course, be held constant while the boilers are being put into service and taken out and turbines put on and off the lines. The cost of attendance is another factor which increases very rapidly as the load on the station goes down. Less men are naturally required to operate the station when running at part of its load capacity than when running on full load, but the attendance cost per kilowatt-hour with the lower load is a great deal in excess. The cost of production varies to a great extent with varying load conditions. It costs nearly six times as much per kilowatt-hour to generate at low load than when working under nearly full-load conditions. It is estimated that $13,000 per year could easily be saved by filling the valleys in the load curve and making the load-factor unity.

Mr. Bailey suggested as a solution to the difficulties of uneven load, the load that would come from a large number of commercial electric vehicles. The 800,000 kilowatt-hours per year that would be required to supplant all the horses now in use in Chicago would go a long way towards bringing about an ideal state of affairs.

Steam economy is considerably better when a unit can be run at its full rated capacity, although this is perhaps not so great a consideration as some of the other points. Coal is burned constantly when the boilers are banked and a number of these must be kept in constant readiness for use to meet the rapid rises and falls that sometimes run as high as 1,000 kilowatts per minute. From three to four hours are required to get a boiler into service so that some boilers must always be banked with a steam pressure nearly normal. A curve shown at this point indicated the number of boilers banked at each period in the day, the peaks of this curve coming, of course, directly over the lowest points in the load curve.

As an example of what could be done in the way of saving through a better load-factor, Mr. Bailey stated that last year there were 34,000 tons of coal burned for which no energy was delivered. This amounted to a loss of about thirty million kilowatt-hours, which might have been saved had the load-factor been constant.

In discussion, E. W. Lloyd brought out the value of the ice-plant load for making summer use of capacity that could be employed for light during the winter.

Factory Lighting.

The paper read by Mr. Flexner on "Factory Lighting" took up the various types of illumination at present used in factories. The value of proper lighting, he stated, is not only realized in increased output of the plant, but in decrease of liability to accidents and ability to do better work and the general improvement of factory conditions. He showed also a chart on vitiation of the air in the work rooms. The tallow candle was the least desirable in this respect and it was followed closely by the oil lamp and gas flame.

Record-Breaking Output of Copper.

The year 1911 was one of prosperity for the copper industry, both smelter and refinery outputs being the largest in its history.

The average price of copper for 1911 was 12.5 cents a pound, slightly below the price of 1910, but near the close of the year the price advanced, the average for December being 13.71 cents a pound. Metal-market conditions continued to improve until the average price had risen, in July, 1912, above 17 cents a pound, the highest price since the panic of 1907.

The smelter production of copper in the United States in 1911 was 1,097,232,749 pounds, or 56 per cent of the world's production, but while the production surpassed that of 1910 by 8,995,317 pounds, the value of the 1911 output was but $137,154,092, compared with $137,180,257 for 1910.

The following table shows the mine and the smelter output of nine leading copper-producing states and Alaska for 1911.

State.	Smelter returns.	Mine returns.
Arizona	303,202,532	306,141,538
Montana	271,814,491	272,847,705
Michigan	218,185,236	291,840,201
Utah	142,340,215	146,960,827
Nevada	65,561,015	67,377,518
California	35,835,651	36,316,136
Alaska	22,314,889	27,267,878
Tennessee	18,965,143	18,850,276
Colorado	9,791,861	8,024,488
Idaho	4,514,116	5,152,937

In 1911 twenty-one states and territories contributed to the copper production, but the three leading states (Arizona, Montana, and Michigan) produced 72 per cent of the total output. Arizona produced more than 27 per cent of the output for the year, Montana slightly less than 25 per cent, and Michigan nearly 20 per cent. The six leading states in 1911 produced 94.4 per cent of the output for that year, and the same states have produced 95 per cent of the total output since 1845.

Boston Edison Section Meeting.

The annual meeting of the Boston Edison Company Section of the National Electric Light Association was held in Mechanics Building, Boston, October 16. Officers were elected as follows: president, H. W. Moses; first vice-president, J. W. Cowles; second vice-president, C. N. Crochett; secretary, S. R. Keyes; treasurer, C. N. Miles. W. H. Cole and C. S. Hadway were elected to the Executive Committee. Papers, illustrated by stereopticon slides, on the subject "Electricity, from Coal Pile to Meter," were presented by the following: "Generation," by C. H. Parker, assistant superintendent of the Generating Department; "Distribution," by L. L. Elden, electrical engineer; "Installation," by J. W. Coles, superintendent of the Installation Department.

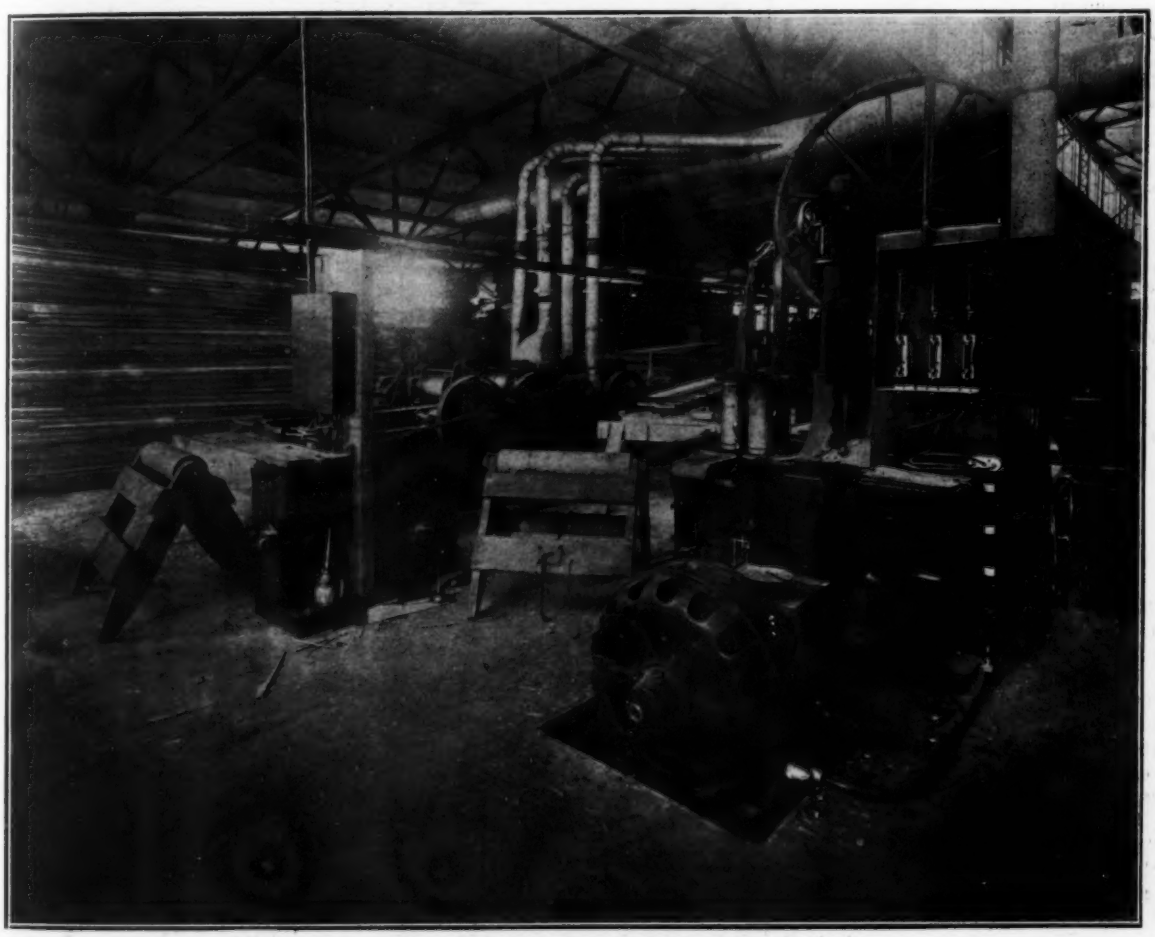
Electricity in Casket Works.

While the actual monetary saving effected by the use of central-station energy in casket works is really of secondary importance to the advantages gained, still many manufacturers require a saving to be demonstrated before the change is made. Comparative figures taken from the books of three factories show that such a saving can be made in the typical plant.

In so far as the advantages of motor drive are concerned, casket factories do not differ from other woodworking plants in which it has been proven beyond doubt that the electric motor has no logical competitor. The peculiar advantages of motor drive in casket factories are space economy, reduced fire risk and increased production at lower power costs, where central-station power is purchased.

Due to the size of the product manufactured and the necessity for considerable storage space, any method of drive that will economize on the amount of floor space essential to actual manufacture should appeal to casket manufacturers. The direct application of electric motors to woodworking machines has been successfully solved by machinery and motor manufacturers and it is now possible to lay out an installation with individual drive exclusively, thus effecting a considerable saving in space. The relative merits of group and individual drive must, however, be determined in every instance by a careful analysis of the requirements of the installation, and while group drive may answer in many cases, it is now the concensus of competent opinion that in a large majority of cases the highest efficiency both for the machinery to be driven and for the electrical equipment, can best be obtained by the application of a separate motor to each unit.

There are other conditions that have an important bearing on the selection of drive for casket factories that should be given due consideration. In modern establishments, high productive capacity will hinge largely on the convenience and rapidity with which work may be handled. Therefore, costly high-speed tool equipment may fail to realize possibilities unless the machines be installed with independence of the usual fixed lineshaft conditions. In shops where productive machines are widely separated, one from another, or where occasional machines must be reached by long lines of shafting, individual drive is vastly more economical and generally preferable. Also, if metered-power costs are to be low, it is axiomatic that motors be operated so as to give a high running load-factor, that is, the input should approach full-load values during any period of time the motor is in circuit. This condition is manifestly difficult to attain except with individual drive, where the power may be



Group of Individually Driven Machines in Casket Factory.

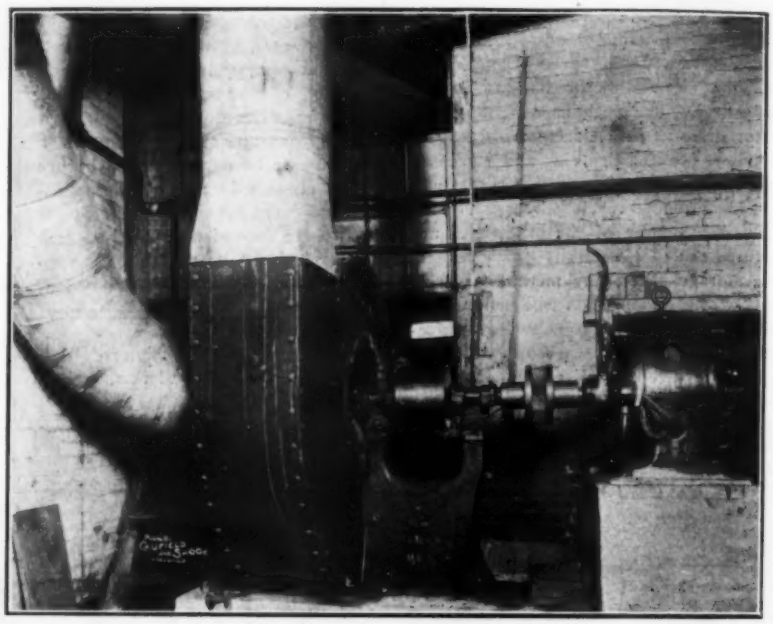
shut down instantly with cessation of productive work.

Regarding fire risk, if power is obtained from an adjacent steam plant the fire risk is great and insurance rates correspondingly high. Mechanical drive necessitates either the dangerous proximity of the boiler room or heavy losses in long steam mains or rope transmission. If central-station power is used, all danger from adjoining power plant is removed. Electric drive not only does away with the inflammable dust inevitably carried into the engine room by the large belt, but also makes possible the complete isolation of engine and boiler either by means of solid fireproof walls or by their installation in a separate building. The elimination of heavy line shafts greatly reduces the danger of fire from overheated journal boxes or from spontaneous combustion of accumulated oily

Double-Pulley Motor in Globe Casket Works.

waste or shavings. It should be remembered that the rate charged by insurance companies, especially where steam boilers are in close proximity to the working machines is exceedingly high, and that by installing complete electrical equipment in a modern fireproof building the annual premiums may be reduced from perhaps 7 to 8 per cent to three-quarters or one per cent. In many cases the savings in premiums will go far in making up for the original cost of the electric installation. This is clearly indicated by the following brief analysis, based on a rate of 8 per cent, not uncommon, for old wooden structures, and three-quarters per cent, easily secured, for modern buildings electrically equipped.

	Cheaply constructed wooden buildings	Best fireproof construction
First cost of woodworking machines	$ 5,000.00	$ 5,000.00
Buildings	6,000.00	10,000.00
Sprinkler system	.....	2,500.00
Pumps, heating, drying kilns	2,000.00	3,000.00
Line shafts, belts and pulleys	3,300.00	.....
Engines and generators	1,000.00	2,300.00
Motor control, wiring, switchboard	.....	5,000.00
Stock, lumber and unfinished work	10,000.00	10,000.00
Total investment liable to loss by fire	$28,300.00	$33,300.00



Motor-Driven Blower in Globe Casket Works.

Insurance premiums, $28,300.00 at 8 per cent	$2,304.00
Insurance premiums, $33,300.00 at 0.75 per cent	287.25
Difference in annual premiums	$2,016.75

For the same protection, the savings in premiums will practically make up the difference in cost of equipment in five years, while the greater period of useful life and lower annual depreciation will more than offset the interest on the additional capital invested in fireproof construction. Owing to the decreased head room and less rigid walls with motor drive, the cost of building construction is often less than is required with lineshafts. The wear and depreciation of buildings and equipment due to stresses resulting from long lineshafts are very great.

Group of Individual-Motor-Driven Planers.

Wood Waste.

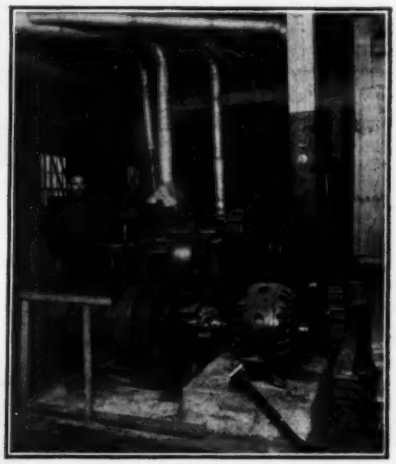
One of the large items of expense in any woodworking plant is that of power.

However it is often erroneously assumed that its unit of cost is very low on account of the wood waste available for fuel, and that consequently there is not the necessity for such economy as is practiced in other industries. However, actual experiences of numerous woodworking plants indicate that a ready market can be found for all waste and where the income from this is not sufficient to pay for the entire amount of power purchased from the central station it reduces power bills to such an extent that the cost of steam power, in comparison, is prohibitive.

No better example of the economy that can be effected by the use of central-station power and the sale of refuse can be given than a casket factory located in Kentucky in which a net saving of $2,500 per year is made. Originally a steam-electric plant, comprising two 75-kilowatt generators driven by Skinner engines, was maintained. The yearly coal bill averaged $3,800 and in addition to an engineer and fireman, a millwright and electrician was employed to look after the equipment in the plant. Since adopting central-station service, one employee has taken the place of the four men previously necessary for the proper operation of the equipment. In addition all refuse not needed for the low-pressure heating system and dry kilns and glue pots is sold, the average revenue from this source being $100 per month. The saving of $2,500 per year, previously referred to, is taken from the books of the company and does not, of course, take into consideration such items as reduced fire risk, greater dependability on power supply, reduced repair bills, etc., all of which if possible to measure in dollars and cents would add materially to the saving now shown. The manager of this plant is an enthusiast for central-station service and wonders that the change over could have been delayed as long as it was.

Motor-Driven Planer at Globe Casket Works.

Motor-Driven Machines in Globe Plant.



Planer.

Another casket factory in which an appreciable financial saving is being effected by the use of central-station service is that of the Globe Casket Company, of Louisville, Ky. This plant is of a size that may be considered typical of the average establishment, the total connected horsepower being 100. The average daily output is about 15 caskets. In this plant as in the one mentioned above, a low-pressure boiler is provided to generate steam for heating in winter and glue pots. Sawdust is the fuel used principally, very little coal being purchased. Shavings and sticks are sold, the average revenue received being $26 per month. One man is responsible for the operation of the boiler and has ample time to keep all equipment is running order. The income from the sale of refuse practically represents the saving effected in this plant.

The following data were obtained from still another plant that formerly used steam, but changed to drive by electric current purchased from a central plant. The motor equipment consists of seven induction-type alternating-current motors,

of the following capacities: One 15-horse power, two 10-horsepower, three 5-horsepower and one 7.5-horsepower.

Paid during one year for power and light	$ 294.32
Received from sale of wood and shavings which were formerly burned	179.60
Net expenditure	$ 114.72
Net expenditure for one year for coal, engineer, boiler compounds, water, etc.	$1,250.00
Savings of electricity over steam	1,135.28
Cost of machines, wiring, etc.	1,102.00

Besides being a great financial saving, it has proved a great convenience. There are no delays for repairs; not one cent for repairs has been spent on the machinery since its installation.

From these few examples it will be seen that by using central-station service a saving can be effected over steam and even over steam-electric operation. Refuse which is usually burned without materially reducing the coal bills can be conserved and sold at a profit that will considerably reduce the cost of electric energy. However, while it is possible to show a saving in many plants, even if the cost of central-station energy equals or exceeds that of steam or electricity generated on the premises it is in the majority of cases found advisable to make the change, due to the many advantages not directly shown on the books. A failure of isolated-plant power; the disability or absence of fireman or engineer at a time when the plant is busiest; the liability of fire or accident to employees; are all points that are of vital importance and should be given proper consideration when a change is contemplated. There are numerous records of cases where each of the items mentioned have caused losses that would have fully paid for the change to the more modern method of operation.

Selection of Motors.

The selection of the proper motors for driving woodworking machines used in casket factories is of the utmost importance and should be given the proper consideration by power engineers. If only direct-current supply is available, motors should be compound wound or of the inter-pole variety, since it is absolutely essential that the motors be capable of resisting the inherently excessive peaks which are apt to occur during the all-day load of the great proportion of woodworking machinery. Direct-current motors should be totally inclosed, except in those special cases where the driving machines are ceiling-suspended away from shavings and sawdust or located in a separately partitioned room, in such manner as to eliminate fire risk.

Large motors should be artificially ventilated and supplied with piping to and from outlet-openings (1.5 cubic feet of air per minute per horsepower is usually sufficient). All controlling appliances of whatever nature, if exposed to sawdust and shavings should be totally inclosed.

Where alternating-current supply is available, the polyphase induction motor with high-resistance squirrel-cage rotor should be specified, since the high-resistance rotor permits quick and frequent acceleration and provides the heavy starting torque required to overcome the inherently great inertia of woodworking machines. The type of alternating-current polyphase motors with polar-wound rotor and internal starting resistance, while possessing admirable torque and starting current characteristics, is not generally recommended for woodworking machines since sawdust almost invariably may be expected to collect on the starting resistance. In a few cases where variable speed with electrical control is desired, polar-wound internal-resistance rotors with collector rings and external resistances may be used. However, specifications should call for inclosed collector rings.

Motor Driving Surfacer.

Motors Driving Planers.

(Continued on page 828)

Casket Factory Data.

The term load-factor is used in these data in such a sense that a load-factor of 100 per cent represents the use for 24 hours every day of power corresponding to the rated capacity of the motors connected. An operating-time load-factor of 100 per cent represents the use of the rated capacity of the motors for the running hours per day specified for each installation.

Globe Casket Company, Louisville, Ky. This plant produces an average of about 15 caskets per day. Twenty men are employed, working 60 hours per week. Combination drive.

Total connected horsepower, 100. Number of motors, 7. Average kilowatt-hours per month, 5,647.

Kilowatt-hour consumption for 9 months: February, 9,070; March, 6,690; April, 5,340; May, 5,930; June, 5,450; July, 4,830; August, 4,130; September, 3,590; October, 5,800.

Load-factor, 10.3 per cent; operating-time load-factor 28 per cent.

MOTOR INSTALLATION

The following is a list of the motors installed with their respective drive. The supply source is three-phase, 440 volts. Motors are of the squirrel-cage induction type.

No.	Horse-power.	Speed R. P. M.	Application.
1	25	850	Direct-connected to 50-inch fan.
1	20	1,200	Direct-connected to 30-inch double planer.
1	5	1,800	Direct-connected to cut-off saw; and belted to glue clamp machine.
1	5	....	Special elevator motor belted to elevator mechanism.
1	15	850	Direct-connected to 24-inch planer.
1	15	850	Direct-connected to 10-inch molding machine.
1	15	1,740	Double-pulley motor driving two line shafts (1) 35-foot shaft driving one Crescent band saw, 31 feet long; one double-head shaper; and one cut-off saw. (2) 35-foot shaft driving one belt sander; one 14-inch bench saw; and one single-head shaper.

Energy is supplied by the Louisville Lighting Company.

Casket company, name withheld; producing about 50 caskets per day.

Total connected horsepower, 252.5. Total number of motors installed, 24. Average kilowatt-hours per month, 17,630. Load-factor, 12.8 per cent.

MOTOR INSTALLATION

The following is a list of the motors installed with their respective drives. The supply source is three-phase, 60-cycle, 220 volts. Motors are of the squirrel-cage induction type:

No.	Horse-power.	Speed R. P. M.	Application.
1	30	1,140	Direct-connected to 36-inch double surfacer.
1	40	1,140	Direct-connected to double 56-inch blower.
1	20	850	Direct-connected to 15-inch molder.
1	15	1,720	Direct-connected to 42-inch 3-roll drum sander.
1	15	1,140	Direct-connected to double surfacer.
1	15	850	Direct-connected to 10-inch molder.
1	10	1,140	Direct-connected to 30-inch blower.
1	10	1,720	Belt-connected to counter-shaft operating machinery in box department.
1	10	1,720	Belt-connected to countershaft driving DE shaper, band saw, tenoner, cross cut and SE shaper.
1	10	1,720	Belted to shaft driving cut-off saw, rip saw, one jointer, one glue machine and branding machine.
1	7.5	1,720	Belted to shaft driving jig-saw, two cut-off saws and automatic glue machine.
1	7.5	1,720	Belted to countershaft driving one variety saw, C. & B. bevel saw, 24-inch joiner.
1	7.5		Belted to countershaft operating elevator.
1	5	1,720	Belted to countershaft operating clipper and sander.
1	5	1,720	Belted direct to curfing saw.
1	15	1,720	Belted direct to DE shaper.
1	3	1,720	Belted to countershaft driving grinders and emery wheels.
1	5	1,720	Belted direct to 12-inch self-feed rip saw.
1	5	1,720	Belted to countershaft driving two swing saws.
1	3	1,720	Belted direct to 16-inch cut-off saw.
1	3	1,720	Belted to shafting operating sewing machines.
1	3	1,720	Belted to hand surfacer.
1	3	1,720	Belted to levering saw.

Casket factory, name withheld; producing about 8 caskets per day. Running hours per week, 60.

Total connected horsepower, 22. Number of motors, 6. Average kilowatt-hours per month, 535.

Kilowatt-hour consumption for 12 months: January, 490; February, 450; March, 500; April, 540; May, 650; June, 570; July, 580; August, 400; September, 420; October, 580; November, 560; December, 690.

Load-factor, 5.2 per cent.

MOTOR INSTALLATION

The following is a list of the motors installed with their respective drives. The supply source is three-phase, 60 cycles, 220 volts:

No.	Horse-power.	Speed R. P. M.	Application.
1	2	1,800	Belted direct to one No. 7 mortising machine.
1	2	1,800	Belted direct to one tenoning machine.
1	3	1,800	Belted direct to one 16-inch rip saw.
1	5	1,800	Belted to shaft driving one 16-inch jointer; and one 16-inch cut-off saw.
1	5	1,200	Belted to line shaft driving one sanding machine; one polisher; and one 10-inch emery wheel.
1	5	1,800	Belted to counter shaft driving one 2,000-pound freight elevator.

Since direct-current motors must be inclosed, their ratings for such operation must be sensibly diminished and larger machines are therefore demanded. In those few cases where variable speed is desired for operating the feed, alternating-current motors may be used of either the adjustable or multi-speed type. Woodworking plants are usually situated in the outskirts of the city, where the central station ordinarily supplies alternating current. The problem therefore, of supplying breakdown service is much simplified.

Owing to the high speed and light moving parts of woodworking machines and the frequent violent application of the load, it is desirable to use belt drive rather than gears or chains, especially as the speed of the driven pulley is usually too high to permit of other than direct or belted connection. The direct drive is coming into vogue in many modern casket factories and is giving excellent results where the motor has sufficiently generous rating to accelerate rapidly and to withstand overloads. As the average depreciation of belting averages 36 per cent per year, it is important to reduce this waste and furthermore do away with any source of slippage between the driving unit and the working pulley.

Improper mechanical connection between motor and machine or motor and countershaft has in some instances caused unjust criticism of motor drive. For direct connection a flexible coupling should be used unless motor and machine are mounted on a common metal bed plate or the motor is attached to the frame of the machine. Most manufacturers of modern woodworking machines have so designed them that they can be readily adapted to individual motor drive. Chain drive or heavy belt with a spring belt-tightener is desirable when the motor must be located close to the machine but cannot be direct connected. Fly-wheels should be used on motors driving machines which have only peak loads of short duration. With all belt drives a belt speed of from 4,000 to 5,000 feet per minute is most satisfactory and economical. Pulley ratios of more than five to one under ordinary conditions should be avoided when possible by using lower speed motors. When it is desired to install a motor on a machine having a speed several times greater than that of the motor, gear drives using steel-cut gears and rawhide or cloth pinions have been successfully employed.

Individual Blowers.

One of the most difficult loads for the central station to handle is that of the large exhaust blowers which are used to exhaust the refuse from the machines. Depending upon the size of the shop, one of these blowers may take from 20 to 150 horsepower, and the load is naturally constant throughout the working hours of the plant, therefore, the resultant bill if central-station energy is used, is liable to be a serious impediment to the customer's adoption of motor drive.

The marked economy of individual blowers, however, is becoming so well recognized that practically all new plants are being equipped in this manner. Some interesting notes on individual blowers were presented in the article entitled "Electric Power in the Manufacture of Wooden Boxes," appearing in the ELECTRICAL REVIEW AND WESTERN ELECTRICIAN, for June 15, 1912.

Commercial Practice
Management, Rates, New Business

William H. Hodge.

Public-utility operators began eight or ten years ago to realize the paramount importance of friendly public sentiment. Since then year by year they have appreciated more keenly the vitality of harmonious relations with the people.

This awakening on the part of utility managers is hardly a natural evolution of public-service operation, but rather is due to the untiring efforts of a comparatively few students of conditions in this industry, with an unusual foresight, who have taken the leadership in an educational campaign for the managers themselves.

One of the foremost students of "public policy" is William H. Hodge, publicity manager of H. M. Byllesby & Company, who, by reason of his broad knowledge of the subject, gained through a study of the question from the standpoint of the public as well as the utility manager, is considered an authority in this matter. Mr. Hodge is more than a student—he is an enthusiast. Although disclaiming any ability as a speaker, he has delivered innumerable addresses preaching the gospel of closer relations before both managers and public; and, in addition, has made valuable contributions to the literature on the subject. Mr. Hodge's most recent effort is a series of four articles which recently appeared in the Chicago *Evening Post*, entitled, "Public Sentiment and Utility Corporations." In the words of Mr. Hodge, "The manager of a utility company, in a sense, occupies a position with reference to the public somewhat similar to that of the office of mayor. He has a varied constituency and he should endeavor as much as possible to come in contact with all the people and to obtain a sympathetic point of view. An atmosphere of exclusiveness about the manager is bound to result to his company's detriment. His door must be open to anyone who is convinced that he must see him. It is of untold benefit to his organization if it is known throughout the city that he is accessible to the poor and rich alike, and that any person, regardless of age, appearance, nativity or affluence may come to his office with absolute confidence that he will obtain a square deal in a pleasant way."

William H. Hodge,
Publicity Manager, H. M. Byllesby & Company.

William H. Hodge was born at Wenona, Ill., April 13, 1881, the son of

the late George L. Hodge and Rosa (Morris) Hodge. He was educated in the public schools of Amboy and La Salle, Ill. In 1897 he entered the employ of the La Salle *Tribune* as a reporter, serving this and other newspapers for about two years. In 1899 Mr. Hodge accepted a position with the Illinois Central Railroad Company working at Clinton, Ia., Carbondale, Chicago and Council Bluffs, Ia.

On March 21, 1910, Mr. Hodge became connected with H. M. Byllesby & Company in the capacity of manager of publicity department, the department being created at that time.

Mr. Hodge is a member of the National Electric Light Association, National Commercial Gas Association, associate of the American Institute of the Electrical Engineers, National Association of Advertising Managers and Press Club of Chicago. He has always taken an active interest in the National Electric Light Association and at the last convention of that organization presented a booklet on "Ornamental Street Lighting" that is being widely distributed by central stations.

In 1901, Mr. Hodge joined the editorial staff of the Council Bluffs *Nonpareil;* after a short time taking similar employment with the Omaha *News.* He joined the staff of the Omaha *Bee* in February of 1903 serving as city hall and political reporter until September, 1906, when with H. J. Gonden he founded the magazine, *Public Service.* He served as managing editor and director of the Educational Bureau with this publication until the presidential campaign of 1908 when he became associated with Victor Rosewater in the Western literary bureau of the National Republican Committee.

Four Views of Exhibit of United Electric Light & Power Company at New York Electrical Show.

A Notable Exhibit at the New York Electrical Show.

At the recent electrical exposition and automobile show held in New York, the United Electric Light & Power Company's exhibit attracted a great deal of attention from not only the public but many central-station men interested in the solving of the problem of attracting the attention of possible customers. The company's exhibit illustrated the simplicity and economy of installing electric light in the store, home and factory. The exhibit consisted of 64 handsome transparencies artistically colored, illustrating the modern method and simplicity with which electric wiring can be installed in the home; also numerous installations financed by the company during the past year, enabling several hundred storekeepers to have their stores wired under the company's "Tungsten Agreement," paying for their equipment in partial payments with their lighting bills. Several prominent and interesting installations of electric motor-drive, pointing out the flexibility and desirability of using electric motors were also shown.

An additional section of the exhibit was devoted to the application and use of household appliances. A fully equipped electric kitchen was installed from which a light collation was served to those who visited the company's booth.

Relation of the Central Station to the Prospective Customer.

It matters not how you may differ with my views, displayed in the handling of this topic, you will each agree when I say, we all appreciate the immense value of catering to and maintaining the good will of the population we serve, says E. M. Addis, in a paper read before the convention of the New England Section, N. E. L. A., held at Boston, Mass., October 15, 16 and 17, 1912. Such being granted, this truth leads to the question, —What is our attitude toward those of the public we *do not* serve?

All individuals living within the boundary of a central-station zone of service are, in fact, served indirectly through participation in the conveniences of electrically-lighted streets, brilliant stores, attractively lighted playhouses or other places of amusement, and constitute the raw material on which we depend to increase our sales of electricity, for they are intimately associated with our product through custom and habit, though not directly served by the central station as customers.

Happily the greater number of them appreciate the advantages of this modern illuminant, which combines saving with increased comfort, and need only to be convinced of the facts, to satisfy them that within the bounds of the most economically handled purse, provision can be made for its purchase, otherwise our progress in the field of expansion would be at a stand-still.

That the public-service companies dealing in the manufacture and distribution of electricity are waking up to the importance of their general policy, as applied to securing new business, by catering to the prospective consumer, may be easily verified by one who will scan the pages of those publications devoted to things electrical: though more often than otherwise, the campaign of education adopted by some of the larger corporations is outlined, it does not necessarily follow that the companies, which serve the small communities, should not be alive to this important subject. Still, for reasons of limited resources with which to establish a new-business department, many of them hesitate to take this step, feeling that the results obtainable would not justify the expense. In spite of this handicap it is possible for such a condition to be overcome without occurring one dollar additional outlay, if the manager will give the question his serious consideration.

Continuing Mr. Addis says: "In the event of this occasion, I suggest that we review the manager's acts of the previous week. You arrived at the office Monday morning, it happened to be blue Monday with you; Sunday's trip to the lake proved a disappointment, you were out of sorts with everything. The morning mail was not of such a nature to dispel the grouch, several notices of drawing at sight on your Company claimed your attention and you secretly cussed them for their presumption; the cashier comes in with a list of delinquents on whom you have expended your best efforts in polite appeals for settlement. 'Send them a notice of disconnect,' you growl. It is sent. One of the notices reaches a customer who, though a little slow in payment, has in the past secured through his influence that short stretch or right of way, which had been holding up the line gang for days, he is your enemy from now on. It would have paid you to have written him just one more letter or to have gone to him personally, preserving his friendship, at the same time convincing him that the cash must be forthcoming, or no more service.

"Right here it is pertinent to ask:—What shall be the relation of the central station to the prospective customer? Shall it be that of supreme indifference and offhand manner? Shall it take the position that it sell current only, with no inducement other than being ready to serve? If so, then the writer's opinion is, that the central station is emphatically killing its chances of securing patronage other than which must automatically come to it, by virtue of the commodity in which it deals being a necessity, and the field in that direction is becoming more saturated each day, for the hypothetical manager is not exaggerated and his future is not distant, when new business will be an exception rather than the rule.

"There is no central station in existence which can afford to take the position of 'stand pat,' for the live community of today does not 'stand pat,' and the public-service company that does will justly gain the unenviable reputation of being indifferent to its public, upon whose goodwill largely depends its success. So it behooves every manager to map out his policy on a broad basis, just how broad will depend on local conditions, for no one can devise, or formulate a plan, which will apply to all indiscriminately, being like many medicinal remedies, which will cure one patient and be sure death to another, but you may be positive that genuine courtesy, honest dealing, the truth at all times, protecting your customers against overcharges, are methods duly recognized the world over for their sterling qualities, regardless of your locality or the class of people you serve, also that the company which fails to look at a complaint from the customer's standpoint, will lose prestige, for the whole public is merely the customer in large numbers.

"Grant every customer a thorough hearing, make full investigation, adding an honest explanation, and you have placed another asset to the public goodwill for the company. Much may be accomplished through a campaign of education by use of descriptive literature, advertising, solicitors and free trials of current consuming devices.

"Increasing numbers of central-station men are beginning to appreciate the importance of low-priced house wiring, as an inducement to the prospective customer. Results demonstrate clearly the eagerness of the public to secure modern lighting equipment when offered at moderate cost. Opinions vary as to the means we shall adopt to install the wiring. Some managers favor the company taking on the work by wiremen in its employ, others are emphatic in their argument, that the contractor should be the medium. Personally, I favor the company carrying out its proposition from beginning to end.

Mr. Addis thought that the contractor does not always do his full share of the work of installation when the central station turned over wiring jobs. This naturally increases the cost to the customer as the contractor's overhead charges are increased. Mr. Addis thought that the function of the central station was more than simply supplying energy and he did not approve of the contractor sharing the benefits of the work and advertising done by the central station. Continuing he said:

"It is just possible there are among us, some who have but recently reached the goal, for which they have from years of patient study and labor been rewarded, the appointment as manager of an electric lighting company. I warn you not to let the feeling of satisfaction and confidence, which you may justly possess, cause you to assume an air of importance nor to adopt an overbearing manner, during the course of your duties, toward that part of the public, at large, for it includes the customers of your corporation.

House Wiring.

The wiring of old houses is becoming easier each year and central stations are becoming more and more successful in securing this class of business.

The greater success has been attained where the central station has instituted a campaign using newspaper advertising, personal advertising and personal solicitation, according to Hugh C. McMillan in a paper presented before the recent Illinois State Electric Association convention.

We have our own ideas about good advertising but we have not any definite ideas of just what we should require in a solicitor, if we have the right idea of this it is evident we have never tried to approach our ideas.

Personal solicitation is the most expensive way to secure residence business,

because one solicitor will draw very nearly as much salary as the smaller cities will spend in advertising and because of this greater cost we should study men more closely.

When we hire a new man for the department he is usually started in the residential section and eventually promoted to the business section or a man is given a mixed territory.

In either case the residence business suffers, the new man who works residences alone is looking forward to the day when he will be put on business, in fact his work is made uninteresting for him from the start, while the man with a mixed territory only solicits the residences when there is nothing to do in the business section.

To be really successful in securing residence business we must impress upon our solicitors that we want this class of business along with the rest and that we intend to develop special men for this class of work.

In Rockford the company works in conjunction with the contractors and wire a six room house for $32 and also offer the deferred-payment plan, making the payments $5.00 down and $2.25 a month.

These two features, the low first cost and the deferred payment, are great talking points for the solicitor but we find very few of the houses we wire accept either proposition, but we do find that all our new customers consider the plan when first they become interested in electricity.

We pass up one of our best chances when we neglect to sell every new customer one or more tungsten lamps and if possible we should install these lamps with efficient glassware. One very successful plan is to make up a unit using a 60-watt lamp, an efficient reflector adapted to the size of the lamp and a Form "H" holder. He have tried this and called the unit the "Three For One Light," our argument being that the lamp gives three times as much light as the old 16-candlepower lamp.

If we take on a new customer and have him equipped with tungsten-filament lamps we must bear in mind that each neighborhood is a community by itself.

Roanoke Railway & Electric Company's Building.

The usual practice has been to work a section, secure what business we could, then go to new fields to conquer; in doing this we do not take proper advantage of the community feature of neighborhoods.

If the solicitor will return to a section after the new customer has received his first low bill he will find the prospects he has passed up have had new life instilled into them by seeing the new house wired for electric light.

There are many such features to the house-wiring proposition that we must study out and take advantage of, but to do this we must train our men especially for the work and make the position of residence solicitor worth while.

Roanoke Electric Show.

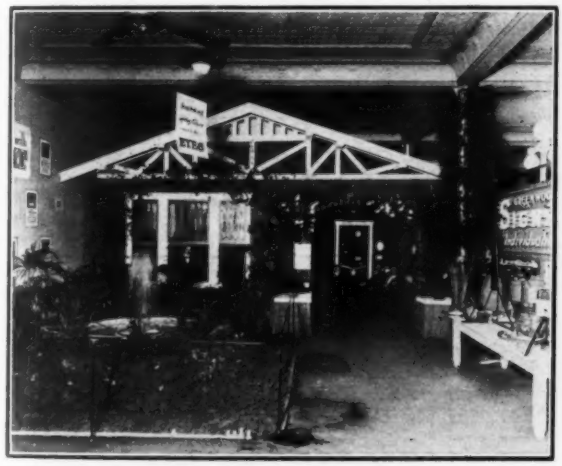
What is claimed to be Virginia's first electric show was held in Roanoke, Va., September 30 to October 12, under the auspicies of the Roanoke Railway & Electric Company. From every standpoint the show fulfilled the most sanguine expectations of its promoters. The attendance was far in excess of that predicted and the public entered into the spirit of the affair to a degree that was both gratifying and surprising. Aside from the educational value of the exposition, considerable actual business was transacted and the management feels that the rather heavy expense incurred in producing a show -worth while is more than justified by the actual and anticipated results.

The feature of the show was a completely equipped modern six-room bungalow containing every conceivable electrical device for the home. As most of these appliances were new in Roanoke, a lasting impression was made on the visitors. The bungalow setting was realistic, a lawn with fountains forming the foreground.

During the afternoon and evening sessions music was furnished by a local band and moving pictures were displayed by the electrical companies. Considerable interest was created by the films illustrating the conveniences of electrical appliances in the home.

Numerous electrical prizes, contributed by the exhibitors were given the ladies holding lucky ticket numbers and the signing of house-wiring contracts was stimulated by the offer of the Electric Company to award a $25 prize, to apply on the cost, to one successful applicant in every 10 signing contracts.

The show received the hearty cooperation of the manufacturers, about 30 maintaining exhibits. The local electrical contractors also participated in the affair.



"Model Cottage" at Show.

Special Illumination for Show.

Electrical Construction

A SYSTEM OF ACCOUNTING FOR ELECTRICAL CONTRACTORS.—I.

By F. L. Decker.

Success in modern business demands not only commercial shrewdness—such, for example, as the ability to buy cheaply and sell at an attractive profit—but it also depends largely upon the accuracy and thoroughness of the system of accounting employed. In every electrical contractor's office the keeping of systematic and easily available records of all transactions is a prime requirement. Upon whether this is done or not may depend the success or the failure of the contractor's business. Proper organization and systematic management are hard and fast rules of the business; and the contractor who must be turned into proper channels; faults must be corrected and abuses remedied. We cannot avoid the old rule that two and two make four, and yet there are contractor who seem to try to abolish such rules. They try to earn before they have really learned the art of earning; their ambition blinds them to the fact that one must learn to do business before one can hope to do business successfully.

The writer of these notes has given the matter of cost keeping for electrical contractors considerable thought for some time past, his aim having been, primarily, to develop a system of accounting which would fully meet the needs of his own business as a contractor. He believes that the system which he has finally formulated, and which is carefully explained in these articles, is one which any contractor may use to advantage. Several months ago a committee of the Illinois Electrical Contractors' Association undertook to find a system of accounting adapted to the needs of contractors generally. This committee, known as the Educational Committee of the association mentioned has approved the system described here and it is being adopted by the Association.

While it is not intended to dwell on the subject of the contractor as a merchant, it may appropriately be said that salesmanship is not merely getting a contract at a competitor's price, or at a little less, but it is securing the sale at a price higher than that asked by the competitor. It is taken for granted, though, that a contract has been secured.

It will doubtless be agreed that any contractor worthy of the name must

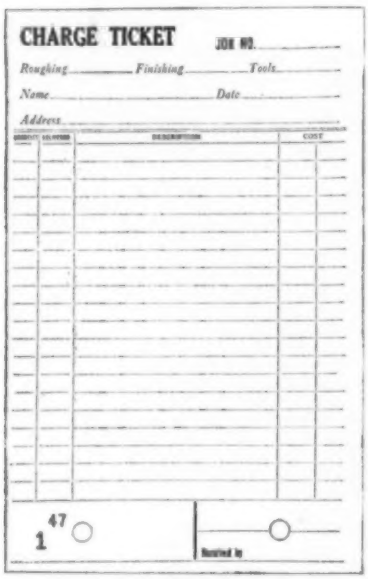


Fig. 1.—Charging-Out Ticket.

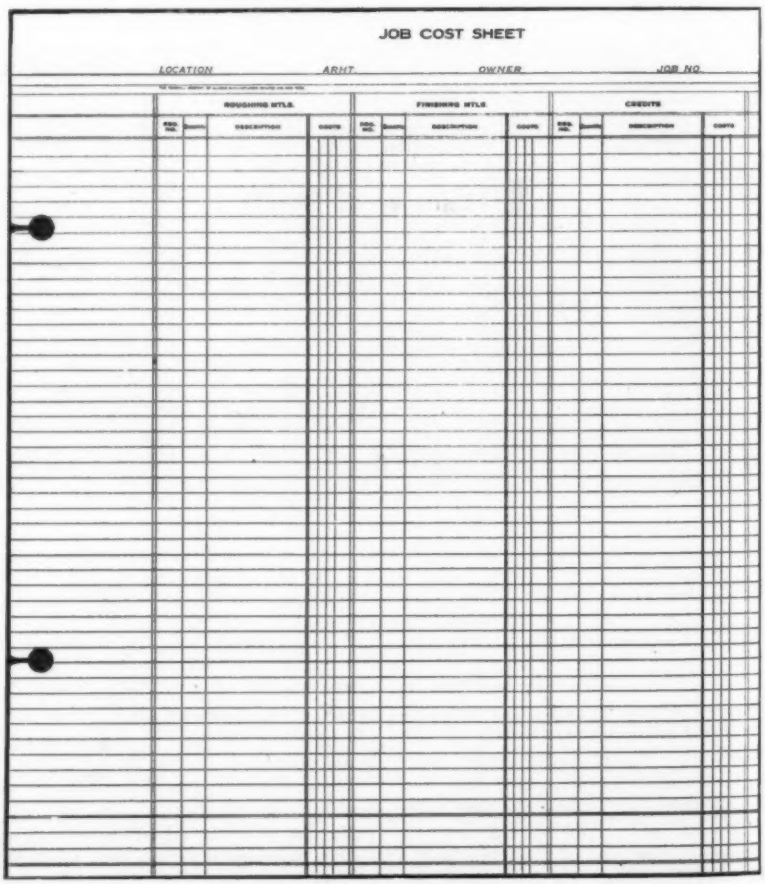
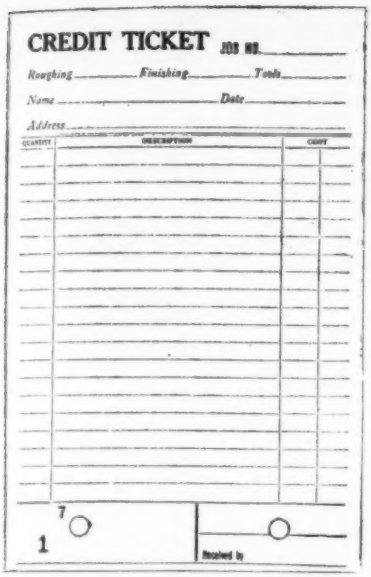


Fig. 2.—Job Cost Sheet.

can anchor to these, and can have the patience to wait, is the man to whom, other things being equal, success is the most likely to come.

As a rule, electrical contractors are men who have graduated from the tool bag. Frequently they carry into business much of the energy and enthusiasm of a boy; but, too often, because of a lack of past experience, they do business without the proper perspective or regard for the future. Such conduct


CREDIT TICKET JOB NO.

Roughing Finishing Tools

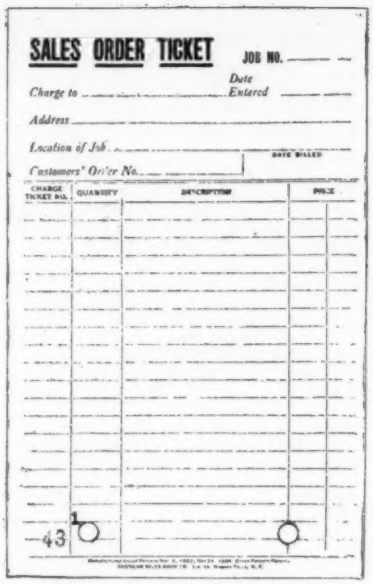
Name Date

Address

QUANTITY DESCRIPTION COST

Received by

Fig. 3.—Form for Crediting Materials Returned from Job.


SALES ORDER TICKET JOB NO.

Charge to Date Entered

Address

Location of Job DATE BILLED

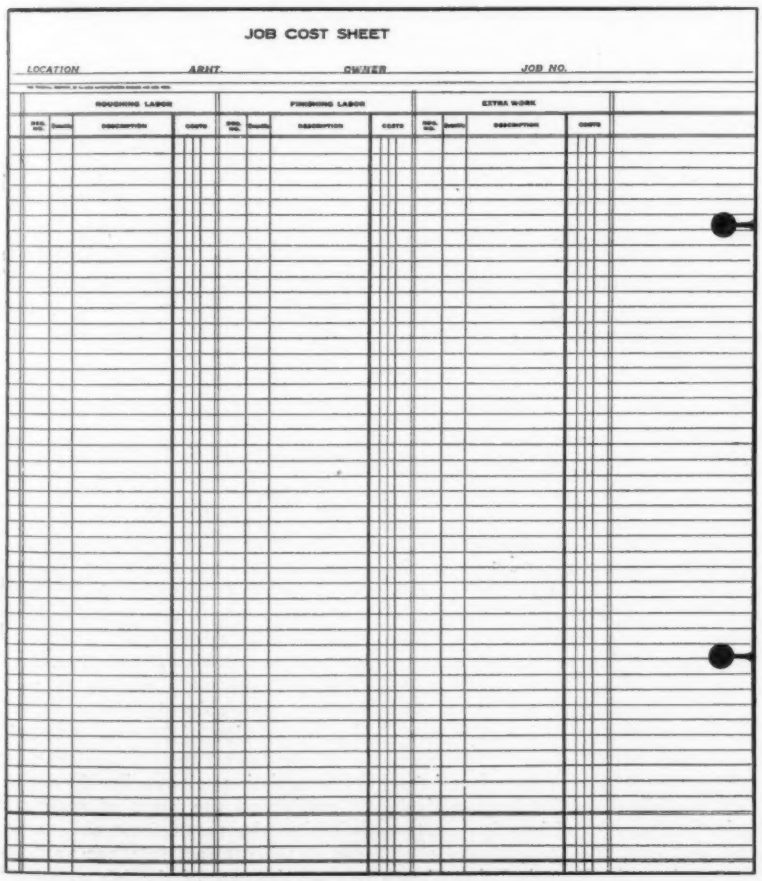
Customers' Order No.

CHARGE TICKET NO. QUANTITY DESCRIPTION PRICE

Fig. 5.—Sales Order Form.

have, besides the ability to secure a contract, an organization back of him which will enable him to execute the contract properly. An essential part of this organization is an adequate scheme of keeping track of expenses incurred in doing the work. This scheme should include complete records of all labor, material, overhead expense, and so on.

The system of accounting here described involves the use of a number of blank forms, cuts of which are shown.


JOB COST SHEET

LOCATION ARHT OWNER JOB NO.

ROUGHING LABOR FINISHING LABOR EXTRA WORK

Fig. 4.—Reverse Side of Job Cost Sheet.

The form shown in Fig. 1 is made up by the printer into a small, inexpensive book; that shown in Fig. 3 in another, and that shown in Fig. 5 in a third book. The other forms are suitable for binding in a large, permanent volume. The binders are supplied by the manufacturers of the sheets. A ledger is also a necessary part of the system.

The contractor should always have available a complete, reliable record of the stock which he has on hand. If his business will not warrant the expense of employing a stock clerk, he should keep the stock record himself. When a consignment of goods is received the purchasing order or sales requisition should be consulted to see whether the goods received are the articles that were ordered. Even if of no other use, such a record avoids misunderstandings with those from whom the goods were purchased. Too many contractors think it too much trouble to keep a sales requisition; they prefer to telephone the order, and, since they have no record of it, they usually take whatever is sent them.

When stock has been received, the next step is to get it on the job properly. For this a blank form like that shown in Fig. 1 may be used to advantage. This is the Charging-Out Ticket.

These charging-out blanks are made of white paper, and are in triplicate. They are made up in small books from which they may be torn readily when they have been filled out. It will be noted also that the sheets are punched for a standard file. The stock for the job is entered in the first Quantity column. The original sheet is kept in the office for a record, and the duplicate and triplicate sheets are placed on the unfilled order file. The unfilled orders are taken to the stock room to be filled. Here the amount of each item actually sent out is entered in the Deliveries column. Thus the confusion which might result from charging material which does not happen to be in stock is avoided, and from the record it may be readily seen what material in addition to that on hand must be ordered.

The duplicate and triplicate sheets are then taken to the job, and are signed for by the workman or foreman. He is given the triplicate sheet, so that he knows just what material he is receiving. The duplicate sheet is then returned to the office and the quantity delivered is checked with quantity ordered on the original sheet. The price of the material is extended on the sheets and the items and price are entered on a Job Cost Sheet (see Fig. 2). It will be observed that this sheet contains separate sections for records of material used in roughing-in, for that used in finishing the contract work, and for that used in whatever extra work may turn out to be necessary. Labor

entries are made on the reverse side of the sheet. This side is shown in Fig. 4. The number of the charging-out ticket is written in the first or requisition column.

All materials returned from the job are entered on the Credit Ticket shown in Fig. 3. This ticket is printed on pink paper and is made out in duplicate. The credit ticket is returned to the office, where the price entries are made in the material-credit columns of the Job Cost Sheet. After the charge and credit tickets have been entered on the cost sheet and the price extensions made, a copy of each ticket is returned to the stock room for a stock record. The duplicate sheets are filed numerically in the office, the object of this filing being to secure a permanent check against all orders in the stock room. The absence of a sheet can be easily detected, of course. Keeping these sheets on file also makes it easy to find the cost of whatever stock is on hand at any time between the taking of inventories. All that is necessary is to credit material taken from the stock and charge the stock with material returned. Such a provision for checking up the stock on hand is of great convenience to the contractor in making up his monthly statement from his books in order to see how he stands financially. It is useful, too, as a check on the Recapitulation Sheet to be explained later.

The labor on any given job is entered on a suitable time card by the workman. No special form is necessary for this. Entries of time are made weekly on the Job Cost Sheet, care being taken to keep the record straight as to whether the work was done in roughing-in or in finishing. In connection with the extra-work column another form called the Sales Order Ticket is used. This ticket is shown in Fig. 5. Yellow paper is used for it, and it is made out in triplicate. Any orders for extra work from owner or architect are entered on one of these sales-order slips. The original is retained in the office, the duplicate given to the workman and the triplicate sent to the property owner or the architect as an acknowledgment of the order. On the back of the slip there is a printed statement to the effect that the order on the slip is a copy of the one on the contractor's records, and that unless notice of corrections be received within three days the order will be considered co rect. Legally this sort of order is just as effective as a written order.

These sales orders are also used for records of time and material orders. Moreover, they can be employed for cash-sale tickets. As a contract is considered equivalent to a sale, it is advisable to make out a sales order for every contract, unless there is some special form to take the place of it.

Referring again to the Job Cost Sheet, it will be assumed that the roughing-in is now complete on the given job, and that the prices and the roughing-in labor have been totaled on the sheet in question. On jobs of an ordinary size, most contractors claim 60 per cent of the contract price as soon as the roughing-in is finished. It is advisable to call this 60 per cent of the contract a sale, disregarding for the time being the 40 per cent balance. In other words, the contract should be treated as two distinct sales. Some contractors charge the owner with the full amount of the contract as soon as the roughing-in is done. Thus the contractor takes credit for work not yet done and values not due, and hence a statement from his books will show assets which do not exist. By entering on his ledger only 60 per cent of the contract, however, he not only claims nothing but what is due him, but he also puts himself in position to make sure whether he has made a profit on the 60 per cent sale or not.

The roughing-in having been finished, the footings should all be taken on the Job Cost Sheet and these should then be entered on the Recapitulation Sheet shown in Fig. 6. Sixty per cent of the amount of the contract should be entered in the Sales column, and the other quantities put in their respective columns. As to what to enter as the overhead-expense item, it may be pointed out that all the expense of doing business over and above the cost of labor and material is overhead expense. The charge for overhead must be estimated from the contractor's previous experience of the ratio of overhead cost to total sales. The Data and Sales Book of the National Electrical Contractors' Association contains a very reliable, convenient chart for computing overhead.

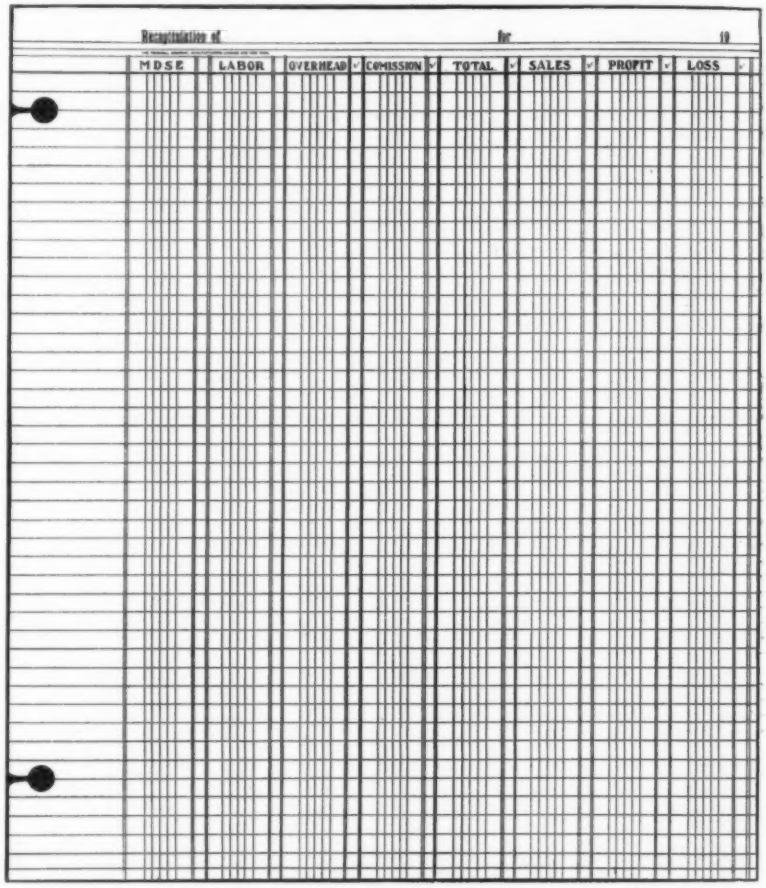


Fig. 6.—Recapitulation Sheet.

If the overhead expense is estimated to be 20 per cent, then 20 per cent of the 60 per cent of the contract will be charged up when the roughing-in is complete. This is charged to the job on the Recapitulation Sheet. The Commission charge takes care of all commissions paid to solicitors or others. If a commission of $10, say, was paid in securing the contract, the entry in the Commission column should be $6.00. By adding all the items of costs and deducting the result from the 60 per cent of the contract sale, the profit or loss on the part of the job completed is discovered.

Installation of Wiring for Electric Light and Power in Railway Buildings.[1]

We have not considered it advisable to prepare any rigid or elaborate specifications; but rather offer some general recommendations and suggestions which, if followed in a general way, will result in giving a first-class and thoroughly satisfactory installation.

We fully realize that local conditions will have considerable weight in determining the numerous details in any installation, as will also the personal experiences and views of the various engineers planning and installing the work.

In view of all these facts we have endeavored to present specifications and recommendations that will enable an engineer to make a perfectly safe and thoroughly up-to-date installation, and yet incorporate his individual ideas.

For convenience in considering this subject we have sub-divided it under eight heads as follows:

(1) Round Houses.
(2) Machine Shops, Boiler Rooms and Engine Rooms.
(3) Store Rooms, Oil Rooms and Oil Storage Rooms.
(4) Coal Sheds and Coal Chutes.
(5) Cinder and Ash Pits.
(6) Passenger Stations.
(7) Passenger Station Platforms.
(8) Freight Stations.

Taking these sub-divisions up in order we have:

(1) *Round Houses.*—There are a number of methods in use for installing wiring in round houses. There is the outside wiring on the roof, where all service and circuit wires are carried either open on horses or other supports, or in conduit laid on the roof. The wires for the drops are run through the roof. This method is not to be recommended, as any cutting or boring of holes through the roof is objectionable. The installation of open wiring upon the ceiling of round house, using the roof beams and boards as supports, has given fairly satisfactory results in a number of instances, but we would not recommend it. The installation of wiring in conduit carried under the floor is a method which has not been adopted to any great extent and we would not recommend it. The installing of all wiring in conduit, the latter being carried either upon the outside of the outer wall, or upon the inside of same, is the method we would recommend, and we submit the following specifications and recommendations:

All wires for this class of building should be placed in conduits, conduits to be carried on either the outside of the outer wall or on the inside of the building. Where conduit is carried on the inside of the building it should be placed upon the outer wall over the windows and at as low a point as the windows will permit. For general illumination around a round house we recommend the use of some type of headlight reflectors placed upon the outer wall in the stalls and approximately eight to twelve feet above the floor. A very satisfactory arrangement is to place two such reflectors at the head of the stall and one at the foot.

For portable lamps it is advisable to run conduit down at least one post in each stall to a point about 6 to 6.5 feet from the floor, where a receptacle should be installed. For the extension use packing-house cord fitted with a plug at one end and a weatherproof socket with handle and wire guard at the other end.

Conduits placed over 16 to 20 feet above the floor are subject to corrosion and should be avoided in all cases.

The permanent lights in each stall should be controlled by a switch located at some convenient point on the outer wall. The portable lighting circuit should be independent of other circuits and so connected as to be alive at all times except when main switch is open.

(2) *Machine Shops, Engine Room, and Boiler Rooms.*—There are practically only two methods of wiring for such buildings: the open or mill construction for lighting and conduit for power, and complete conduit construction for both light and power. The latter method we would recommend, and we submit the following specifications and suggestions covering same.

Machine Shops.—This wiring may be divided into two sections, for lighting and for power.

Lighting.—For general lighting the wiring should be run in conduit overhead, provided with suitable outlet boxes at the desired locations. The lighting fixtures should be tungsten clusters or high-wattage units. No drops should be used. Rigid fixtures are recommended. For the lighting of individual tools, wires should be run in separate conduits under the floor to a receptacle located upon or near the tool. An extension should be provided, made up of a plug, a sufficient length of packing-house cord and a weatherproof socket with handle and wire guard.

Power.—The wiring for power should be run in conduit under the floor, and a separate circuit should be run direct from the panel box to each tool. All motors of over five horsepower should be provided with starting apparatus having overload and no-voltage attachments.

Each motor circuit should be controlled by fuses located in the panel box, and in no case should two or more motors be controlled by the same fuses.

Wiring for machine tool and other motors should be figured at the full capacity of the motor for each individual motor. The feeders supplying power circuits may be figured at 70 per cent of the total aggregate capacity of the motors it supplies.

All wires supplying current to motors, where placed in conduit underground and subject to dampness, should be lead covered, with either rubber or paper insulation, or a high grade of rubber insulation with double braid.

It is recommended that the capacity of all fuses in panel boxes on motor circuits be 25 per cent more than that at which the overload switch at the motor is normally set.

Engine Rooms.—For general lighting the use of tungsten clusters or high-wattage lamps is recommended, the cluster or single lamps to be located as requirements demand. The wiring should be run in conduit supported overhead from roof structure. Where wiring is liable to be subjected to great heat, we would specify fireproof wire.

Each cluster or unit should be controlled by a switch located either in the panel box or at some other convenient point. Lamps suspended from ceilings on drop cords are not recommended.

In all cases where it is required to run conduits and wires on stationary engines for the purpose of illuminating the various parts of same, it is recommended that all such conduits start from the top of the engine and each branch be run down to either a light outlet or receptacle so that no oil can accumulate in either the vertical or horizontal runs of the conduit. It is further recommended that all conduit work around an engine be made water tight so as to avoid oil coming through the different fittings to the inside of same.

Boiler Rooms.—For the illumination of steam and water gauges around boilers it is recommended that the conduits be run on top of boiler front and that fireproof wire be used. Where branches are to be taken off for the purpose of illuminating steam gauges and water glasses an extension tube or piece of conduit should be used in place of a drop cord.

For general illumination tungsten clusters or single high-wattage lamps located over the firing space may be used. For illuminating the space back

[1] Report of a Committee of the Association of Railway Electrical Engineers.

of the boilers, an entirely independent circuit should be run in conduit, with an outlet back of each battery of boilers, each outlet to be provided with a weatherproof socket and wire guard. At this point provide a plug receptacle for each battery of boilers, for a suitable light to be used under and around boilers for cleaning purposes. For these portable lights we would recommend the use of BX flexible wire or some other wire having a non-combustible insulation.

(3) *Store Houses and Oil Houses.*—All such buildings should be wired in conduit throughout. For store houses we would recommend the use of single drop lights placed in the most desirable locations. Packing-house cord should be used instead of the ordinary drop cord and all lamps should be provided with lamp guards. Switches for the control of lights may be placed in the most convenient locations; but the fuses protecting all circuits should be placed in metal panel boxes outside of the store room proper, preferably in the office.

Oil Houses.—All conduit and fittings should be both water tight and vapor proof. All switches should be placed in a weatherproof box on the outside of the building. No switches nor key sockets should be allowed inside the building. All lights should be on rigid pendants provided with vaporproof sockets, vaporproof globes and wire guards. No drop cord of any kind should be used. Extreme care should be used in the wiring of oil houses so as to afford every possible protection from vapors.

(4) *Coal Sheds and Chutes.*—The wiring for this class of structures should be in conduit throughout, with the best grade of re-inforced cord wherever drop lights are needed. All lamps should be protected by wire guards. No fuses, switches, or key sockets should be placed in rooms where coal dust is liable to accumulate in any great quantity, and all fuses should be inclosed in metal boxes.

(5) *Cinder and Ash Pits.*—Wiring for the lighting of such locations may be run in conduit underground or overhead on poles, as conditions may indicate to be most desirable. Arc lamps, tungsten clusters or high wattage single lamps may be used; but we would recommend the use of clusters. The lamps should be placed at an angle of about 45 degrees on pipe brackets or goosenecks on poles at a height of about 18 to 20 feet.

(6) *Passenger Stations.*—It is recommended that all wiring be run in conduit. Where offices of any nature are to be located in the passenger station, we recommend that provision for extra circuits be arranged for by either of the following methods or a combination of same: Extra conduits should be run for additional circuits, or three-fourths-inch conduit should be run to all such offices to provide for extra circuits. In all cases provision should be made for extra circuits in the panel box.

As the lighting of passenger stations is very largely dependent upon the architectural features and the opinions of different persons, we have made no recommendations on this feature, leaving the matter wholly to the engineer in charge of the work. The arrangement of circuits and location of switches should be such as would give the best control for economy.

(7) *Passenger-Station Platform Lighting.*—This should be run in conduit from the building underground to metal posts. These posts should be provided with a wiring space in the base covered by a weatherproof cover All fuses for open platform lighting should be placed in the panel box in the building. This will probably frequently necessitate carrying more than 600 watts on an outside lighting circuit, which, in our opinion, is not objectionable for this class of service. We would further recommend the use of lead-covered wire with rubber or paper insulation, or a high grade of rubber insulation with double braid.

(8) *Freight Stations.*—The wiring for all freight stations should be run in conduit. The office portion should be wired in the manner customary in office buildings. In the ware room we would recommend the use of tungsten clusters or high-wattage lamps at a proper height to properly illuminate the room. Drop lights are to be avoided wherever posssible. Where drop lights are necessary, the best grade of drop cord should be used.

We have purposely avoided recommending any particular make or brand of materials, but wish to state most emphatically that none but the very best materials on the market should be used. For conduit and fittings we recommend any of the standard grades of sherardized or galvanized. For wire we recommend only a high quality of rubber, paper, varnished cambric or other insulation.

As there are a number of good standard sockets, fuses, panel boxes, conduit fittings, etc., on the market, the specifying of such materials is left to the judgment of the engineer.

We wish to call especial attention to the fact that the permanent value of an installation more often depends much more upon the quality of the workmanship than upon the quality of the materials used. Too great care in installing wiring cannot be exercised.

The National Electrical Code should be followed in all cases.

An Interesting Job of Remodeling.

A unique piece of electrical construction has recently been completed in Portland, Oregon, in the re-wiring of the old Marquam Building. This building, built 23 years ago, is of fireproof construction, brick and concrete with steel frame, and covers 200 by 100 square feet and is ten stories in height. The original wiring was installed completely in wooden moulding, in most cases being concealed back of the picture moulding, the prevailing outlets being brackets, which were dropped down from the moulding above. The new system consists of all conduit construction, so far as the feeders and circuits are concerned, the wiring for the rooms being installed in Greenfielduct concealed behind a special molding installed purposely to accommodate the wiring. The extensions from this system to the room centers are made from special three-inch junction boxes, and are run in rigid conduit supported by steel straps to the I-beams. There being no space between the floors and the fire proofing, it was a physical impossibility to absolutely conceal all the work, but only a very small part of the conduit is visible. The conduits in the corridors (all circuits up to the rooms) were concealed under a new tile floor which is being installed along with numerous other improvements, and a special chute was constructed for the risers. The system was designed and installed by the West Coast Engineering Company, 708 Couch Building, Portland, Ore.

Examination for Louisville Electricians.

In entering upon a new fiscal year, the Building Department of the City of Louisville, Ky., has recommended that an ordinance be passed requiring that all electricians employed in the Gateway City be compelled to pass an examination before the Kentucky Actuarial Bureau, an organization which rates all fire-insurance risks in the Bluegrass commonwealth. Such an examination, it is claimed, would guarantee the capability of every contractor and registered electrician allowed to work in Louisville. In commenting upon the electrical field in his annual report, Electrical Inspector Edward J. Theobald has stated that comparatively little trouble has been experienced by him during the fiscal year ending August 31, 1912, in securing the proper installation of wires. One of the needs of his department is an efficient means of answering calls for emergency inspection. Louisville experienced the greatest building year in her history, $7,945,091 worth of building being done during 1911-1912.

National Association of Electrical Inspectors.

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Conduit Terminals Behind Switchboards.

Question 204. In case of conduit runs brought up behind switchboards in open work, though same be close to the board, are condulet-type fittings required?

Answer 1 (L). Yes; so as to provide proper spacing of the open wiring.

Answer 2 (E). Section *d*, Rule 28, in the first paragraph of the section, the following appears, which would seem to fully answer this question: "At exposed ends of conduits (but not at fixture outlets) where the wires pass from the conduit system without splice, joint or tap, an approved fitting having separately bushed holes for each conductor is considered the equivalent of a box."

Answer 3 (B). An approved terminal fitting, of which there are several on the market, should be used, except where impracticable in the case of station or other large switchboards, where it may be necessary to accept a terminal bushing instead of the fitting.

Answer 4 (F). Approved end fittings should be used (Rule 28, Section *d*, first paragraph, National Electrical Code), unless the installation was made as per Rule 26, Section *e*, third paragraph, in which case end fittings would not be required.

Answer 5 (N). Rule 28*b* requires conduit to be continuous from outlet to outlet, or to junction boxes or cabinet. If the conduits back of the switchboard do not terminate in a properly constructed gutter or cabinet, they should be provided with approved outlet boxes or other terminal fittings, so that each wire will emerge from the conduit system through a separate, insulated bushing or hole.

Answer 6 (D). Conduit runs terminating behind a switchboard should be equipped with some type of approved outlet, such as boxes or condulets, etc., so that the wires will be given the proper mechanical protection until they have secured the required separation.

The matter appearing in this section consists of questions on the National Electrical Code, its interpretation and meaning, and questions as to whether certain methods of wiring are in accord therewith. These questions are gladly received from anyone interested, even if not a member; they should be sent to the secretary with any needed elucidating sketch. They are answered by each member of the Executive Committee according to his knowledge of what the ruling would be in his jurisdiction.

It should be understood that no pretense is made to give an authoritative interpretation of the Code. This is a voluntary association; it has representation on the Electrical Committee of the National Fire Protection Association, which prepares the Code, but it has no right, and claims no right, to give a final interpretation of anything in the Code. It is only intended to give the interpretation which seems correct to the members of the Executive Committee. No attempt is made to edit or correlate the answers from the different members of the Committee, as it is felt that the occasional difference of opinion is calculated to lead to a further study of the matter in question, further discussion and the final clearing up of obscure points.

The aim is to help toward a better understanding of the Code on the part of all; a more uniform conception of its meaning; increased precision in applying it; and harmonious action of those using it, for the common good.

Answer 7 (O). We always require an approved terminal fitting of some type; except in case of heavy cable in stations and substations, where sometimes simple bushings are allowed.

Answer 8 (P). We do not always require that conduit runs terminating in the rear of switchboards be provided with approved types of terminals. In the case of large sizes of pipe, the condulet becomes clumsy and sometimes impossible of application through lack of space. Generally speaking, when the wire does not bend materially where it leaves the conduit, we are satisfied with a standard pipe bushing.

Answer 9 (K). It is the practice in this territory to insist upon the use of suitable terminal fittings wherever conduits are run to the rear of switchboards, rheostats or similar appliances, provided the conductors of the circuit are not too large to make the use of such a fitting practicable. In that case we require a bushing to be put on the end of the pipe and the pipe to be filled around the wires with an approved insulating compound. (See Rule 28*d*, first paragraph.)

Grounding Short Runs of Conduit.

Question 205. Proper grounding on very small conduit installations, of say not over a total of 15 or 20 feet, is very expensive. What is the general custom on grounding requirements for these small jobs?

Answer 1 (D). It would not be deemed a serious defect if the grounding of short lengths of conduit (less than 15 feet) were omitted.

Answer 2 (B). As regards short runs of conduit, I would say that, provided the provisions of the Code were carried out, it would be necessary to ground them; but in practice this is not always practicable to do or reasonable to require. In this city we insist that all conduit work have the conduit grounded except where short lengths of conduit are used in connection with knob-and-tube work; for instance, the run from a ceiling outlet fed by a knob-and-tube circuit over in conduit to a side brick wall and down same to a side outlet. As there is no practicable way that we know of to ground this short run without grounding to gas pipe at outlet, which is not permitted by the Code, we do not require the grounding of same.

Answer 3 (F). If the conduit is installed as per Rule 26, Section *e*, third paragraph, the conduit need not be grounded. (See Rule 28, section *f*, and Rule 26, section *e*, National Electrical Code.)

Answer 4 (E). Where short sections of conduit are used for the protection of exposed wiring on side walls, and such conduit is installed as required by Rule 26, section *e*, the conduit or pipe need not be grounded.

Thus reads the last sentence of section *f*, first paragraph, of Rule 28. Section *e* of Rule 26, is quite comprehensive, including the character of the insulation of the wire, etc., which I would suggest our correspondent read. The use of conduit under different conditions than those quoted in Rules 26 and 28 would seem to indicate that grounding of the conduits, even though they be in several lengths, would be necessary.

Answer 5 (K). Except where it is used for simple side-wall protection, conduit should be grounded thoroughly. A poor ground may be worse than none. (See Rule 28 *f*.)

Answer 6 (P). Our general custom is to require the grounding of all secondary systems. We also require the grounding of all metal conduit or armored cables when these constitute a *system* rather than merely a mechanical protection.

Answer 7 (N). Since the Code contains no definition, and does not determine the length of a conduit system, any conduit installed under Rule 28 should be grounded as required. In this territory, however, we have ruled that short sections of conduit, which can be considered as parts of individual fixtures, may be considered as parts of the fixtures and installed under the requirements of Rule 30. Sections supplying more than one fixture or lamp receptacle we do not consider to come under this ruling, and these must be grounded. The only exception is that allowed under the Code for side-wall protection. However, where short pieces for side wall protection are installed against or near damp objects or surfaces, we have found that it is not safe to omit the grounding of the pipe.

Answer 8 (L). The custom in this locality as to conduit grounding is the same for small as for large installations; it must be done, as the hazard is just as great in proportion. Since there are generally on various floors of all buildings, water, gas, or steam pipes, the item of expense should not be so great. For instance, if the conduit was installed on the fourth floor of a building and no water or gas pipe was on that floor, but there was a steam pipe, the conduit could be grounded to that and the steam pipe in turn grounded in the basement either directly to earth or to a water main, so as to secure a positive ground in case the boiler was disconnected. In such an improbable case as there being no gas, water or steam connections, the only alternative would be to ground the conduit directly to earth.

Answer 9 (O). Strictly, a small complete conduit installation should be grounded just as much as a large one. Nevertheless, in this territory we often get small installations (not more than 20 to 25 feet of conduit being used) in outlying sections where no water pipes exist and the coke ground would cost more than the rest of the wiring, and in such cases we do not require it. Again, where the short length of conduit is used in connection with knob-and-tube work, we do not require it. The value of the ground and possibility of getting one to remain damp in this rolling farm land on the outskirts of the municipality is very questionable, especially in dry periods.

Among the Supply Men

C. Russell, treasurer of the Esco Electric Supply Company, Albany, N. Y., is one of the live wires of the electrical supply business. The company joined the Jobbers' Association at the August meeting, and is experiencing a lively business at the old stand, 10 and 12 James Street, Albany.

The Columbian Electrical Company, St. Louis, Mo., is conducting a special campaign on telephone and electric light specialties. Business is good in Kansas, Nebraska, Iowa and Missouri, particularly among the smaller central-stations and the Independent telephone companies.

M. G. Campbell has resigned his position as sales manager of the B-R Electric & Telephone Manufacturing Company, Kansas City, Mo., and leaves for Florida on November 1. Mr. Campbell has been in the employ of the company for approximately ten years. His first position was salesman, traveling the state of Kansas, later on going to Oklahoma. He was appointed sales manager in 1905, and has occupied this position until the present time. Mr. Campbell is one of the most popular men in the Southwest, and leaves a host of friends behind him who will wish him success in his new field. He is a Statesman-at-Large of the Rejuvenated Sons of Jove, and has always taken a prominent part in advancing the interests of the Order.

The Pacific States Electric Company, San Francisco, Cal., is planning to occupy a new six-story building now being constructed on Mission Street near Second. It is expected that the moving will be completed about December 15. This will give the company one of the most completely equipped and modern electrical supply houses in the country. The floor space is 59 feet by 160 feet, with a fine ground-floor store and five stories above. Among the features of the new building will be an automatic electric control of the freight and passenger elevators, dumb waiters, a complete electrical installation exposed and arranged to demonstrate the varying character of electrical work, and there will be a ladies' rest room and electric kitchen. The ground and lower floors will be occupied by the sales and storerooms, while the general and executive offices will be located in the upper stories. William M. Goodwin, vice-president and general manager, is one of the most enterprising men on the coast, and has done much to build up a big supply business.

The Commonwealth Electric & Supply Company opened a new supply house in Pittsburgh on October 1. The officers are Frank R. Fortune, vice-president and general manager, who for the past eight years has been sales agent for the Cooper-Hewitt Electric Company, with offices at Pittsburgh; the treasurer is Howard S. Evans, and the assistant secretary and treasurer is Justin R. Swift. In addition to doing a regular jobbing business and carrying a complete line of supplies, the company will also act as selling agents for the Westinghouse Electric & Manufacturing Company's apparatus, and will be equipped to offer prospective buyers engineering advice in the matter of the proper selection of power apparatus. Theodore Varney, at

present on the engineering staff of the Westinghouse Electric & Manufacturing Company, will be in charge of the apparatus department. The company will devote a large amount of space in its six-story building to a demonstration and show room for all manner of electrical devices for the home. This department will be in charge of a competent sales engineer, assisted by women demonstrators.

A. W. Lindgren, business manager of the Northern Electrical Company, Duluth, Minn., who has been appointed Statesman for Duluth of the Rejuvenated Sons of Jove for the eleventh administration, writes us that the first rejuvenation ever held in Duluth was put through very successfully on Saturday, October 12. There were 18 candidates, four of whom were from Superior, Wis. There were about 15 out-of-town visitors to help put on the work which was carried out very well, especially when it is considered that the team had had no previous rehearsal. The out-of-town visitors included representatives principally from Minneapolis, although there were some from St. Paul, Chicago and Boston. The members of the Sons of Jove are enthusiastic and there is already talk of having another rejuvenation soon.

The Indianapolis office of the Western Electric Company is shortly to move into new quarters which have been leased at 121 South Pennsylvania Street. The new building, which contains 31,000 square feet of floor space and is five stories high, is better adapted to the needs of the local organization than the old building which it has occupied for the past five years. A retail store is to be opened on the ground floor of the new house, for selling everything electrical—for business, factory and home use. The store will be but two squares from the principal retail street of Indianapolis—Washington Street—and will therefore be quite convenient for the retail trade. The remaining floors will be used for offices and warehousing. There will be complete stocks of electrical apparatus and supplies. It is intended to have the new building serve as a distributing point for material intended for the use of the Central Union Telegraph Company.

Fixtures which meet the requirements for an extremely difficult electric lighting job in Louisville, Ky., have been supplied by Burdorf & Company, well known supply men of that city. The Burdorf house is furnishing about seventy ceiling showers, adapted for indirect lighting, to the new Jefferson Public Library, owned and operated by the Louisville Free Public Library Board, at Eighteenth and Jefferson Streets. The drops are provided with alabaster shades, and a soft, clear light is thrown to the ceiling, whence it is reflected and evenly distributed throughout the library interior. Mr. Burdorf is naturally proud of the fixture outfit for this job, inasmuch as the requirements of interior lighting for a library are very exacting.

Stockholders of the Manhattan Electrical Supply Company have voted to increase the capital stock of the company from $750,000 to $5,000,000, of which $500,000 is preferred and $4,500,000 common stock. It is understood that the directors have made an allotment of the new stock for sale to employees on the installment plan at not less than par. Announcement of the date for the payment of the dividend and closing of books will be made later. The purpose of the capital increase is to enlarge both manufacing plant and distributing facilities.

Public Service Commissions

WISCONSIN.

The Wisconsin Railroad Commission, in a recent decision, has ordered a physical connection to be made between the Clinton Telephone Company and the Bergen Telephone Company. From the testimony, it appeared that the subscribers of the two systems had enjoyed a free exchange of service up to April, 1912, when such free exchange was discontinued because of the inability of the two companies to come to any agreement. The Clinton Telephone Company refused to continue the old practice on the ground that it would be unfair to that company, inasmuch as it had over six times the number of subscribers that the other company had, and hence would be giving much more than it received. In the present case, however, this argument could not carry much weight, in the Commission's opinion, for a test made upon the two systems before the free exchange of service was abolished showed that the number of calls each way was practically the same. In this connection, the Commission raised the point that, when it is considered that the service has a value to the party called as well as to the party calling, an inequality in the number of calls does not necessarily mean that the exchange of service is of more value to one company than to the other. But the principle was laid down that, if a physical connection was to be effected, the rates for such connection should be based upon the cost of service and that if it cost one company more than the other it would hardly be reasonable to require the companies to exchange service on equal terms. While the extra charge may be derived from a charge made to the connecting company or from a toll charge for calls passing between the two exchanges, the Commission was of the opinion that the former would be defective, inasmuch as it places the burden upon the connecting company instead of upon the patrons of both companies who are responsible for the calls and for the work involved in handling those calls. With the latter plan, the division of the toll earnings between the utilities may be made so as to reimburse each utility for the expense incurred by it in furnishing the service. In the instant case, there were no facts available to indicate that the cost is greater to one company than to the other, nor was there any way of determining what the cost to each amounted to. Such cost can only be determined from a study made upon the systems with toll rates in force. In its present decision, the Commission ordered that the two companies shall establish a physical connection between their systems; that a toll charge of two cents per call shall be made on all completed calls; that the company on whose lines the call originates shall collect the revenue involved; that the toll revenue shall be divided equally between the two utilities. The order specifies that, if experience shall show that the toll rate as ordered or the division of

revenue needs revision, the matter may be reopened.

The Commission has denied the application of the Interstate Light and Power Company for a certificate of convenience and necessity, relative to the extension of its high-tension transmission system into the town of Mifflin. The petitioner based its claim upon the facts that it had contracts to supply certain mines with electrical power, where the power was wanted immediately, provided the company could obtain permission to enter the territory. The town of Mifflin, in which the mines are located, is now without electric service, but the Mineral Point Electric Light Company holds permits from the town which authorize it to extend its present system so as to include the district in dispute. In urging its case, the petitioner claimed that the local company did not have a *bona fide* intention to extend its service as claimed, but only to secure such permits to prevent the petitioner from extending its system into the territory. At the time of the hearing, the Mineral Point Company alleged that although practically no construction had been begun, it had been engaged upon the preliminary work incident to such construction for over six months, and that complete plans for the rehabilitation of its plant and the extension of its system had been prepared. After an investigation, the engineers of the Commission reported that both companies were in position to furnish adequate service within a short time and that there was not sufficient business in the district to warrant the existence of two competing companies. The fact that the local company was not yet actively engaged in furnishing service was held by the Commission not to be a sufficient reason for withholding the protection which the law affords in preventing destructive competition. Furthermore, if any company holds a permit to furnish service in a given district, it must be given a reasonable length of time to do so. In the instant case, the Commission was not satisfied that the objecting company was financially able to carry out the work it had undertaken and consequently the issue of this decision was withheld until it became evident that the Mineral Point Company was in a sound financial condition. The petitioner maintains a central station at Galena, Ill., and at present is supplying numerous towns and cities in northern Illinois and southern Wisconsin with electrical power.

To enable the Milwaukee Electric Railway and Light Company to acquire the property of the Central Heating Company of Milwaukee, the Commission has authorized the issue of $850,000 in common stock which is to be exchanged at par for the common stock, bonds and mortgage of the heating company.

INDIANA.

An act of the Legislature which became effective in January required the interurban railroads of Indiana to be equipped with block signals, but gave power to the Railroad Commission to postpone the date of installation for any road which found it impractical to install equipment by that time. The Commission made a postponement affecting all roads but has now issued orders requiring automatic block signals on nine interurban roads, totaling 142 miles in length, by July 1, 1913. The Commission expects that all the mileage upon which it is necessary to have block signals will have them in operation in less than three years.

OHIO.

The Public Service Commission has ordered the Shreve Electric Light & Power Company and the Citizens Electric Light, Power & Heat Company of Shreve to overhaul their lines and construct and relocate the same where necessary, so that there shall be at all points a clearance of not less than one foot from the wires and lines of all other companies.

The Commission has denied permission to the Defiance Gas & Electric Company to issue bonds to the value of $290,000 and stock to the value of $90,000. It was the intention of the company to issue these bonds in exchange for bonds now outstanding.

The Commission has refused to give its authority to the Union Gas & Electric Company for the issue and transfer of capital stock of the par value of $500,000 to the Columbia Gas & Electric Company. It was desired by the company to issue these securities to carry out the terms of a lease or contract made with the Cincinnati Gas & Electric Company in 1906. The Commission refused to pass upon the interpretation of this contract and stated that if said contract was valid the proposed transfer of securities did not come under its jurisdiction.

The Port Clinton Electric Light & Power Company has been authorized to sell its property, with the exception of real estate, to the Northwestern Ohio Railway & Power Company, and the latter is authorized to purchase the property for $30,000. The latter has also been authorized to issue its first-mortgage, five-per-cent bonds of the par value of $193,000, to be sold at not less than 8 per cent, the proceeds to be used for additions to its power house, rolling stock, transmission system, etc. The Commission had already in July last authorized the company to purchase the property of the Toledo, Fort Clinton & Lakeside Railway Company and to issue bonds to the value of $1,100,000 and capital stock to the value of $1,300,000 to W. S. Barstow in payment of the same.

The Orrville Light, Heat & Power Company has been authorized to sell its property, franchises, etc., to the Massillon Electric & Gas Company, and the latter is authorized to purchase said property and pay $20,000 therefor.

MASSACHUSETTS.

The Massachusetts Gas & Electric Light Commission has rendered a decision on the complaint of citizens of Natick, Mass., for an improvement in the quality and a reduction in price of gas. The Board recommends the reduction in price to $1.50 per thousand cubic feet. The present rate is $1.65.

The Commission has rendered its decision on the petition of the mayor of the city of Malden for a reduction in the price charged the city for street lighting by the Malden Electric Company. The contract for street lights expired in June, 1911, but the company has continued to operate the same lamps under the same conditions. The installation on the above date consisted of 124 alternating-current, inclosed arc lamps operated at 6.6 amperes and 430 watts, 22 50-watt tungstens burning all night and every night, or about 4,000 hours annually; and 1,154 50-watt tungstens burning on a moonlight schedule, about 3,100 hours annually. Since June 30, 1911, the all-night incandescents have been increased to 23 and the dark-hour incandescents to 1,172. Under the contract the city paid the company $2,824.28 per month for not less than 123.5 arc lamps (one-half cost of one lamp being paid by adjoining city) and 1,167 incandescent lamps, and for additional lamps at the rate of $100 per year per arc and $18.75 per incandescent. Since June 30, 1911, the company has charged the city $96 a year per arc, and $20.80 for each all-night incandescent and $18.30 for each dark-hour incandescent.

A tentative draft of a new contract was submitted in evidence by which it appeared that the company has offered prior to the filing of this petition to make a ten-year contract with the city for the same types of lamps as now, for $86.40 per arc and $18.72 per incandescent, provided the city should use and pay for 123.5 arcs and 1,176 incandescents, throughout the period. This was substantially a reduction of one per cent for each year of the ten. It developed that there was a desire on the part of the city authorities to employ a more efficient type of arc lamp than is now in use. The Mayor requested that the Board, if it should find present prices too high, should determine "what the city ought to pay for a

magnetite arc lamp operated with 310 average watts all night and every night."

The Board ruled that its authority did not include the determining of the type of lamp which a city should use, nor the establishing of a price for a new and non-existent service. It suggested that if the city decided to use the lamp mentioned and the company should make a price therefor, it would make a decision based on the new conditions. No attempt was made by either party at the hearing to demonstrate the fair price for street lamps, based on the cost of this service. The Board stated that the city should not be charged more for the electricity required to operate its incandescent street lamps than the maximum net price charged private customers. The company supplies electricity not only in Malden but also in Everett, Medford and Melrose. The territory is largely residential, but there is considerable industrial activity in Malden and Everett.

The plant is valued at $1,289,057. The outstanding stock amounts to $525,000; bonds, $100,000; notes, $423,225.

The business of the company has steadily increased during the past five years, and its earnings have been more than sufficient to cover expenditures for repairs and renewals, dividends and depreciation. During the five years the price of electricity for commercial and private uses has been reduced from 15 to 11 cents.

The Board recommended that the price of the 6.6-ampere lamp now used be not more than $85 each, that of the 50-watt tungsten incandescent, all-night lamps, be $18.00, and the price of the 50-watt tungsten burning on a moonlight schedule be not more than $15.50 per year, so long as not less than the present number of lamps in each class are in use.

Soldiers' and Sailors' Monument.

Illumination of Naval Pageant in New York.

Upon the occasion of the mobilization of war vessels in New York City recently there was an illumination not only of the vessels themselves, but of Riverside Drive and surroundings. There were 32 battleships anchored in the Hudson River and altogether 127 ships of all classes. These were decorated with flags and banners, and at night were outlined with incandescent lamps. One of the accompanying illustrations shows the illumination of two of the battleships, the other the Soldiers' and Sailors' Monument and Riverside Drive. About 25,000 lamps were used on the Riverside Drive, three miles of its length being illuminated with festoons of lamps and the names of naval vessels which have taken part in notable engagements. On the viaduct at 130th Street the following names and inscriptions were outlined in incandescent lamps:

MAINE—"Public opinion should be suspended."

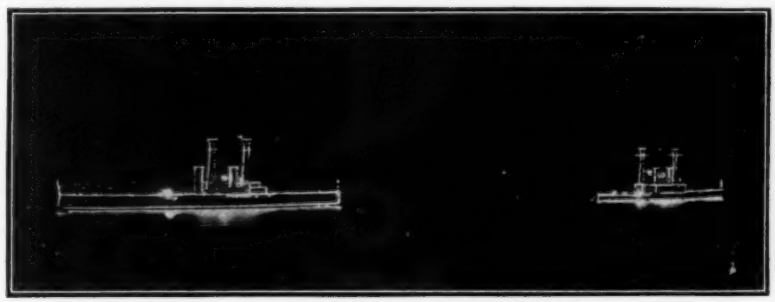
BON HOMME RICHARD—"I have just begun to fight."

CONSTITUTION — "The enemy has struck."

OREGON—"Arrived and ready for any duty."

OLYMPIA—"Fire when you are ready, Gridley."

The New York Edison Company took charge of the work and did it most promptly and efficiently. The New York Telephone Company with commendable enterprise established public telephone stations at the various landings along the waterfront, each in charge of an attendant. By means of newspaper announcements the numbers were given for the station at the landing adjacent to each of the ships. Messages for those aboard any of the ships could be sent to the proper station, where the attendant wrote the message down, placed it in an envelope and turned it over for delivery to the next boat leaving the landing for the ship.



Illumination of War Vessels.

The United Electric Light and Power Company replaced the arc lamps for about a mile on Riverside Drive beyond the viaduct with flaming arcs. The New York Edison Company provided the officers and men of the fleet with complimentary tickets to the Electrical Show.

The Hendrick Hudson monument and statue at Spuyten Duyvil was illuminated by six searchlights, which made it stand out very conspicuously, as it is on quite an elevation and was at the upper end of the long line of battleships.

To assist him in extending the city's hospitality, the Mayor of New York appointed a committee of representative citizens, the officers of which were Herman Ridder, chairman; Henry W. Sackett, vice-chairman; J. P. Morgan, treasurer; Edward H. Hall, secretary. Various sub-committees looked after the details of the festivities. The Illuminations Committee consisted of Charles W. Price, chairman; Herman A. Metz, vice-chairman; William Berri, Hugo Reisinger and Louis Wiley.

Efficiency in Manufacturing.

At the meeting of the American Society of Mechanical Engineers on November 12 a paper will be presented by Edward B. Passano on "Measuring Efficiency in Manufacturing." The meeting will be held at 29 West Thirty-Ninth Street, New York, at 8:15 p. m.

Illinois State Electric Association.

Convention at Peoria, October 22-24.

The thirteenth annual convention of the Illinois State Electric Association was held at the Jefferson Hotel, Peoria, Ill., on Tuesday to Thursday of last week. From all considerations, this gathering was the most successful ever held by the body. The attendance broke all records not only in its registration totals, but in the numbers present at each of the sessions. About 130 representatives of central-station companies and their lady guests, and about 90 representatives of manufacturers, supply dealers and interests were present. A large number of papers was presented and these received close attention. Along with the more strenuous work of the convention there were some very enjoyable entertainments that were provided chiefly through the generosity of the supply men. No exhibits were made this year.

At 2:40 p. m., on Tuesday, the first session of the convention was called by President H. A. Foster. Without any preliminaries the program was opened by the reading of a paper entitled, "Central-Station Accounting," by Albert S. Scott, of the Public Service Company of Northern Illinois. This paper gave an outline of a system of accounts on the lines of that recommended by the National Electric Light Association and adopted by some of the largest consolidated companies in Illinois, 80 plants in this state alone being operated by this group. The classification was arranged as to detail to suit small, medium and large companies and covered expense, investment and income accounts. This paper was briefly discussed by H. E. Chubbuck, F. M. Sinsabaugh, Mr. Mallory and Mr. Scott.

Ice-Making With Electric Power.

J. R. Cravath, of Chicago, read a paper on "Ice-Making With Electric Power." This paper calls attention to the desirability of central-station companies investigating ice manufacture from undistilled water, so as to practically eliminate the need for any steam equipment. If a fairly pure grade of water is available, raw-water ice of marketable clear quality can be readily made by taking special pains to remove the air bubbles and impurities that collect in the center and cause turbidity. This is done by agitating the water during freezing and by refilling the central core with pure water. If distilled water is used for this purpose, only a small low-pressure boiler is needed; 20 pounds of water can be distilled with one pound of coal. From 40 to 60 kilowatt-hours are required per ton of daily output in an electrically operated ice plant. The bulk of the power is needed for the ammonia compressors. Of the auxiliaries, the air compressor in a raw-water plant requires about one-quarter horsepower per ton of daily ice-making capacity. From 1 to 4 gallons of cooling water are needed per ton of daily capacity, depending on its temperature.

J. G. Learned, Chicago, opened the discussion of the paper by stating that the ice-making load is particularly desirable because it is highest in summer, at which time it calls for 24-hour supply. If the central station is to make any headway in connecting such plants to its lines, it must confine its attention to securing raw-water plants. In Chicago the Commonwealth Edison Company supplies about 2,000 kilowatts to these plants and the results are very satisfactory to all concerned. In one plant the cost of producing one ton of artificial ice runs from 48 to 52 cents, whereas the freight charges alone on bringing natural ice from the Wisconsin lakes to the local delivery platform are 55 to 60 cents per ton.

In reply to a question as to the relative value of electric power in absorption and compression plants, Mr. Cravath pointed out that the absorption process is one that requires much heat and relatively little power; therefore it is suitable where much exhaust steam is available. But the compression system is the only one worth considering where electric power is to be utilized extensively or entirely.

J. J. Frey, Hillsboro, questioned the wisdom of running a raw-water plant, when he could make distilled-water ice at 80 cents per ton by using the exhaust from his generating station. He had found practically no trouble from oil in the exhaust. Mr. Cravath said that where exhaust steam is available and an ice plant is established as an auxiliary, it should, of course, be a distilled-water plant. But where electric power alone is available and there are no boilers, or if power is to be supplied to an independent plant, particularly a new one, the raw-water process should be employed. E. W. Smith, Kewanee, stated that the investment for an independent distilled-water ice plant is much larger than for a raw-water plant, because of the necessary boiler equipment.

As to combination electric and ice plants, Mr. Cravath said he had found it almost impossible to segregate the various items of cost so as to arrive at a true conception of the actual earning power of each department. He cited one plant with a 10-ton daily capacity that produced an annual ice revenue of nearly $6,000. A. S. Scott thought that segregation of electric and ice accounts was not as difficult as it seemed, because it was relatively easy to keep close check on all electric costs; all the others can then be charged to the ice department.

C. W. PenDell, Chicago, was confident that raw-water plants are going to become much more numerous in the future. There should be little demand for distilled-water ice if a good quality of drinking water is available. It is difficult to change an existing plant to electric power on account of the usually heavy investment in boilers and steam equipment. All new plants, however, should be of the raw-water type and be electrically operated. They can be given very low rates, if service is off-peak at all times. Mr. Cravath declared, on the contrary, that it is seldom necessary to exact the off-peak requirement in summer when the ice demand is large and the lighting peak small. In winter off-peak load may be insisted on. J. G. Learned was inclined to agree with him.

Series Tungsten Street Lighting.

H. G. Hoke, of the Westinghouse Electric & Manufacturing Company, presented a paper entitled, "Series Tungsten Lamps for Street-Lighting Purposes." This paper opened with a general discussion of the lighting requirements for various classes of streets. Nearly all our cities need more, better diffused, and better distributed light. The ornamental tungsten cluster system has been used very extensively for the business streets of both small and large cities, but, in the opinion of the author, the best results in the lighting of important business streets are obtained from efficient and high-candlepower arc lamps. A residence district is the ideal place for the series-tungsten system. Parks and boulevards can also be very well illuminated in this manner as also outlying or suburban districts. Series tungsten lamps are now made in sizes ranging from 32 to 350 candlepower, and for currents ranging from 3.5 to 8 amperes; their useful life varies from 1,300 to 1,500 hours. They greatly excel the old carbon lamps, which had a tendency to restrict the extension of series incandescent lighting. Two general methods are used for street series incandescent systems. One employs what are known as adjuster sockets; this system is operated with a series of lamps across a constant-potential circuit. In parallel with

each lamp is a small reactance coil taking very little current, normally, but which develops a counter voltage equal to that of the lamp when the latter is burned out or removed, thus maintaining the continuity of the circuit. No regulator is required with this system. The other system employs a regulator, somewhat similar to that used on series arc systems. The paper includes a description of the essentials of regulator control panels and of fixtures used with series-tungsten systems.

Another paper covering substantially the same topic, written by Arthur J. Cole, of the Westinghouse Company, was also on the program and had been printed, but was not formally presented.

The discussion of this topic was opened at the session on Wednesday morning. E. H. Negley, Canton, brought up the question of protection of series tungsten systems against lightning. He had found considerable damage to lamps during severe lightning storms. Several speakers gave their experience along this line. C. F. Snyder, Bloomington, said he had found the film cutouts to be destroyed but not the lamps. One gentleman from Chicago Heights said that when arc lamps are used on the same circuit with tungstens under normal conditions everything seems to be satisfactory, but during storms or line surges serious troubles usually develop. Therefore, the Public Service Company of Northern Illinois was abandoning the use of such combination series circuits. Others who discussed this matter were E. W. Smith and F. W. Reimers.

Electric Vehicles.

A paper entitled "The Electric Vehicle as Central Stations Should View it," was presented by George H. Jones, of the Commonwealth Edison Company. The electric vehicle affords one of the best fields for exploitation to build up the load-factor with practically no additional investment charges. Electric-vehicle load is of such a character that it helps to fill up the valleys in the load curve. It is practically off-peak service. This was shown by several typical load curves of public garages, in one case handling only passenger vehicles and in the other almost entirely electric trucks. There is a difference between these two types of garages, the latter furnishing some load during the middle of the day for boosting charges. Typical daily load curves of the Commonwealth system during summer and winter days were shown and on these were superposed curves that would show the battery-charging load which would result if half the horses in Chicago were replaced with electric vehicles. This load was estimated to be 94,000,000 kilowatt-hours per year, to take care of which no additional investment in station equipment would be required. This off-peak output would increase the daily load-factor 13.2 per cent. The lines along which a central station should proceed to develop this load were suggested as follows, (1) use electric vehicles for both commercial trucks and business men's runabouts extensively in your own business; (2) if the vehicle manufacturers are not represented in your community by active agents, take an agency yourself for both pleasure and commercial cars and start a garage equipped to give good service; (3) establish reasonable rates for this service to encourage its development; (4) have at least one man in the organization whose business it is to post himself on the vehicle situation; (5) co-operate with the Electric Vehicle Association and the National Electric Light Association so as to obtain the benefit of their splendid publicity work; (6) devote a considerable sum annually to advertising the electric vehicle both by means of newspapers, handbooks, bill boards, etc. Mr. Jones closed his paper by calling particular attention to the very extended advertising campaign now being conducted under the auspices of the Electric Vehicle Association, which includes seven classes of periodicals. He showed typical advertisements prepared along these lines. The outlook for the electric vehicle is particularly favorable at this time. In Chicago, for instance, in 1910 there were less than 100 electric trucks, whereas now there are over 400.

The discussion consisted largely of questions regarding features of electric-vehicle performance. Mr. Jones said the Commonwealth Edison Company has a very large fleet of electric trucks and delivery wagons and is keeping very close tab on the costs and other features of performance. Replying to a question by Mr. Cravath as to whether the gasoline car is likely to be soon superseded, Mr. Jones said that he felt there was a field for both the gas and electric vehicles, the former being particularly suited for long-hauling service at high speed and with relatively few stops, whereas the electric vehicle is best adapted to city use with frequent stops and somewhat shorter runs. However, the range of activity of the electric type of car is continually being increased and electric roadsters capable of 25 miles an hour and over are now procurable, which can make long runs into the country with a current consumption under three ampere-hours per mile. As to the relative maintenance costs, it is undoubtedly true that these are much greater for the gasoline truck, as is shown by the very much larger proportion of these that are to be found in the repair shops of companies employing both types of vehicle. The weight on the tires of the larger vehicles is the same in both gasoline and electric types. The total costs, including every conceivable item that can be charged against the vehicle and also including the fixed charges, have been found to be 23 cents per mile on the Commonwealth Edison Company's electric trucks.

H. W. Young, Chicago, advised having a good maintenance man to locate the vehicle troubles of the patrons of the company. J. H. Delaney, Chicago, said he had been told by some packing-house interests that their saving from the substitution of electric vehicles for horse-drawn wagons was nearly 40 per cent. Mr. Jones said that in some cases it may come to this value, particularly where large trucks are involved, but he would be more inclined to give the figures more conservatively as from 10 to 25 per cent saving. In service in the congested districts of large cities which necessitates frequent starting and stopping, the electric vehicle is very much to be preferred. Its accelleration is better and produces less violent strain on the running gear and tires, and in general the wear and tear on an electric car is much less than that of the gasoline car.

At this point J. R. Cravath sought permission to call the attention of the Association to the primer on "Light, Its Use and Misuse," which has been prepared under the direction of the Illuminating Engineering Society by a committee of which he was a member. Arrangements are being made whereby central-station companies can secure copies thereof at cost, and it was highly desirable that they interest themselves in the movement for the improvement of the human efficiency of lighting, which has now been found to be much more important than the mere physical efficiency. This should particularly appeal to the central station because it almost invariably means the use of more light.

Window Lighting.

C. F. Snyder, Bloomington & Normal Railway & Light Company, presented a paper entitled "Window Lighting." This is now one of the most important advertising means that a merchant can have. In considering the lighting of windows, one must consider the width, depth and height, as well as the class of goods to be displayed. Most windows have a transom bar about eight feet above the floor, along which a wireman can run conduit and provide angle sockets and reflectors to throw the light downward and to the rear of the window. A perfectly lighted window is one in which a person standing outside can see neither lamps nor reflectors. The use of lamps around the edges of the window is obsolete. Since window displays in many cases are changed once a week, and each trim frequently requires the light in a different place,

it is desirable to provide adapters so that the angle of the lamps can be changed; it is also well to provide an abundance of lamps so that, if dark goods are displayed more light can be provided. This has frequently been the cause of complaint of poorly lighted windows. Window lighting may be handled on the flat-rate basis if controlled by a time switch or patrolman. The contention made by some companies that the ornamental lighting of business streets detracts from the window-lighting business has not been found to be warranted, because usually it necessitates a higher standard of window lighting, which, of course, calls for more current. Sometimes windows are provided with shelves which obstruct the light from overhead; in this case it is desirable to re-illuminate beneath each shelf, which can be done by inserting reflectors in the underside of the shelf. When colored goods are displayed it is sometimes desirable to put colored caps on some of the lamps so as to harmonize with the display. Co-operation of the window trimmer and the electrician usually brings good results in providing a flexible system of window lighting to suit various displays. The use of miniature electric letters in windows is becoming common. The best way to get business houses to employ window lighting extensively is to secure the co-operation of some progressive and liberal-minded merchant, who will equip his windows along appropriate lines, and his neighbors will very quickly fall in line.

The discussion hinged chiefly about what should be the rate on the flat-rate system. In one city this is made 0.8 per cent per watt per month; in another one cent per watt per month is charged. This has been found a very simple rate in making up the total charge. Moreover, it induces the merchant to maintain his window lighting up to the proper standard. Where the charge is entirely on the meter basis the merchant is liable to have spells of economy occasionally, and turn on only part of his lamps, or leave them off entirely.

High-Tension Distribution Networks.

A paper prepared by H. B. Gear, of the Commonwealth Edison Company, entitled "High-Tension Distribution in Northern Illinois," was read, in the absence of the author, by C. O. Rider, of the Public Service Company. Throughout the northern part of the state there have been developed very extensive networks, which are being interconnected by transmission lines. This tendency will doubtless receive further development. The southern transmission system of the Public Service Company of Northern Illinois is operated chiefly at 33,000 volts. The northern system operates at 20,000 volts, with subsidiary lines on the four-wire system at 4,600-8,000 volts. The use of 33,000 volts will be made standard throughout the system ultimately. The main generating stations are from 25 to 50 miles apart. Three types of construction of pole lines have been standardized. Class A has one or two cross-arms so as to provide for one or two transmission lines at 33,000 volts. A ground wire is carried on an angle-iron bayonet, extending above which pole and space is provided for a private telephone line. Class B construction has two cross-arms, each carrying two insulators. One of these on the upper arm carries a ground wire. The Class C construction is intended for distributing lines chiefly. It has only one cross-arm with a pin on each side of the pole and the third insulator mounted on a cap on top of the pole. The use of 4,600-8,000 volts permits the elimination of substations by placing the regulators at a point where a substation is already established. A weather-proof type of regulator in small sizes is now available for mounting directly on the pole; 33,000-volt transformers in sizes up to 75 kilowatts are usually of the outdoor type. The problem of lighting protection is an important one. In larger substations the aluminum-cell arrester is justified, but in outdoor stations the simple horn gap with resistance in series is the only type permissible, although the first cost of a general transmission and distribution system is higher per kilowatt of maximum demand in the earlier years when the number of customers along the lines is small, in later years the development of diversified loads along the lines increases the load-factor to a point where the investment per kilowatt is not above normal and the income more than covers the fixed charges.

E. L. Brown, Elmwood, opened the discussion by a brief description of the high-tension lines in his system. He called attention to the desirability of getting farmers along the lines to become customers of the company. He has about 75 farmers connected to his line. They use more or less current throughout the day. As a rule, farmers cannot get enough help, particularly for housework, and when they have found what a convenience electric devices are they are invariably the most grateful customers on the system. C. W. PenDell asked whether it was feasible to use single-phase motors larger than 10 horsepower on farmers' lines. Mr. Brown said that the largest he has now is 7.5 horsepower.

The question of using iron wire for the distributing lines in rural districts was brought up again, there having been considerable discussion of this matter at the last convention. T. Bass, Bloomington, said that he employs iron wire for all farmers' lines up to three miles from the transformer and has found that it gives excellent results. E. L. Brown considered the scrap value of iron as so small that he used copper wire exclusively. Although this involves a higher initial cost it results in a really lower ultimate cost. J. J. Frey, Hillsboro, said that usually farmers' lines had not been built substantially enough. These should never be smaller than No. 6 copper wire. He considered the construction described in Mr. Gear's paper excellent, if the company has sufficient capital to provide for it. He asked whether trouble had been experienced with neighboring telephone lines. E. H. Negley, Canton, said that telephone troubles resulted largely because the transmission and telephone lines were placed too close. As regards protection from lightning he had found the use of a lightning rod on each pole consisting of an angle-iron projecting three feet above the pole and connected to a No. 6 iron wire to ground to give the best results. H. W. Young, Chicago, discussed the subject of switching on transmission lines. This he considered as best done by means of automatic air-break switches in which is combined a fuse. These are particularly serviceable on 33,000-volt lines. He described such a switch, which is constructed so that it cannot become inoperative from freezing. L. Owen, Peoria, said he had found that a bayonet type ground on each pole was much better than the running of an overhead ground wire. E. L. Brown also said he had lost faith in the overhead ground wire because of the frequent interruptions to service caused by its breakage. He believes that it is entirely possible to use longer spans, so as to cut down the number of poles required per mile. Several other speakers gave the results of a rather unfortunate experience with the overhead ground wire.

T. Bass said that he minimized the troubles to adjoining telephone lines by asking farmers to give written permits to place the power poles on their own land and a considerable distance from the telephone line. H. A. Foster, Fairbury, found it impossible to get written permits, but usually gets oral permits of this kind and has had no trouble in ten years, except in one case in which lawyers had advised him that since the line had been in place without protest on the part of the farmer for many years the latter had no recourse to law to compel its removal.

Ornamental Post Lighting.

The session on Wednesday afternoon

was opened by the reading of a paper entitled "Ornamental-Post Lighting" by W. F. Hansgen, of the People's Power Company, Rock Island. A well planned system of ornamental posts gives a very strong impression of progressiveness, cleanliness and safety. Gloomy thoroughfares are avoided by most people. The business of established streets has been drawn to other sections or from one side of the street to the other by an attractive lighting system. The paper described the general methods used for installing tungsten cluster systems. Glare should always be avoided and the light should be soft and uniform. One of the most important questions connected with such an installation is "Who is going to pay for it?" This is determined largely by local conditions. Contracts have been made with merchants, property owners and with the communities themselves, sometimes a combination of interests meeting the expenses. The best method, however, is to endeavor to secure the contract from the city itself. Maintenance costs of the installations in the Tri-cities were also included in the paper.

F. M. Sinsabaugh declared that for the ornamental lighting of a street the revenue must chiefly be derived from the merchants and advertisers located along it. J. G. Learned thought that the tendency is rather toward having the municipality assume the costs. A very good scheme is to have the merchants or property owners pay for the initial installation and to have the city pay for its operation and maintenance. Too high an illumination is not desirable because it interferes with window lighting. Mr. Sinsabaugh said he felt that the post lighting should be installed first. This will produce a demand for better window lighting and for the use of electric signs. Mr. Learned replied that, inasmuch as ornamental street lighting is difficult to obtain, for those companies that have considerable window lighting already in service it is much better to conserve what load is in hand along this line than to spend excessive efforts in getting ornamental street-lighting load. Moreover, he said, too aggressive pushing of the post-lighting system may compel the placing of all lines underground, since the ornamental systems are almost invariably served from underground mains.

T. W. Gregory, of East St. Louis, described the conditions that prevailed there and particularly the sharp competition between the merchants of that city and its big neighbor across the river. It was therefore practically impossible to get the local merchants to spend any money for an installation of this kind. The agitation was kept up, however, and the city was finally induced to put in a system of ornamental magnetite arcs. H. W. Young described a system in which gas lamps had been converted to tungsten equipment and which had proven very successful. J. H. Delaney described the installation of a tungsten cluster system southwest of the stock yards in Chicago, which had had a very important influence in raising real-estate values along the streets illuminated. President Foster briefly referred to installations in Pontiac, Forrest and Watseka, which have already been made or are about to be placed, and in all of which the merchants pay for the equipment and the city assumes the maintenance.

Mr. Delaney said he was convinced that it was much better to rent the posts to the merchants than to sell them outright, because in the latter instance the maintenance is usually very poor. The result is in many cases a far from uniform and, in fact, frequently a dilapidated appearance instead of an attractive one. The company can make more profit by selling the posts outright than it can by merely renting the equipment, but in the latter case, since it takes care of the maintenance itself, the effect is very pleasing. Unless the posts are properly maintained the entire installation is apt to react against the central-station company. Several other speakers spoke strongly in favor of having the city assume the maintenance or, if the matter is left entirely to the merchants, of insisting upon a maintenance contract under which the company takes care of the equipment.

House Wiring.

H. C. McMillan, Rockford, read a paper on "House Wiring," which is published in another part of this issue. He stated that the Rockford Electric Company does no wiring at all, but turns over all business obtained to the local contractors, it being the custom to favor no particular one of them. About 150 old houses have been wired in that city since the first of last May.

The discussion was opened by Mr. Harlow, Chicago, who claimed that giving the work to the contractors causes frequent delay and this generally incurs the ill-will of the new customer. It is, therefore, very important to have the work done promptly. Mr. McMillan replied that no trouble has been experienced from this because, if one contractor is unable to do the work promptly, the job is assigned to the next one on the list in rotation, provided he can guarantee to start on the work directly.

At this point J. G. Learned suggested that central-station companies should call their active new-business men "salesmen" and not "solicitors." R. S. Wallace suggested also that the terms "new business" or "contract" departments be abolished, and that this branch of the organization be called the sales department. F. M. Sinsabaugh suggested further that the word "consumer" be dropped and replaced by the word "customer."

The discussion then turned to the relative value of different ways of securing house-wiring business. Messrs. Johnson and Sinsabaugh said they were convinced that the personal call of a salesman is very much more effective than any other form of advertising. George Linn, Bloomington, said he believed that all forms of publicity were good and should be used together. Unless newspaper and bill-board advertising and other forms of publicity are used to prepare the way for the salesman, the latter alone are not effective. T. Bass, Farmington, believed in direct-by-mail publicity literature. H. J. Pepper, Champaign, declared that such and, in fact, all forms of advertising, only prepared the way for the salesman. C. W. PenDell said that salesmen alone are not at all adequate in a large city. All forms of publicity must be used and none neglected. Mr. McMillan said that much advertising is very poorly prepared and is, therefore, not effective. If properly handled by an expert it will bring excellent results. E. L. Brown also concurred in the use of all methods of publicity. A hint from any employee should be followed up by sending out folders and other publicity literature. Then the salesmen have quite an easy time in signing up the prospect.

President Foster cited some troubles due to having houses wired by out-of-town contractors and curbstone wiremen who put in poor and cheap construction, which almost invariably is not in accordance with the National Electrical Code. Frank J. Baker, Chicago, described a method that had been used in one instance to check up the construction work of an outside contractor who had underbid one of the local men; an inspector was employed for several weeks and he found so many violations of the Code, which the contractor was compelled to rectify before the company would agree to give service, that the contractor declared he would never undertake a job in that city again. E. McDonald, Lincoln, stated that if no city inspection ordinance is in force or obtainable from the Council, the company should refuse to connect its service until all defects in the wiring are corrected. C. A. Yatman, Monticello, said that he had secured the passage of a city ordinance and had had his electrician appointed as city inspector. He gave a very humorous account of the condi-

tions prevailing in his community, which has some 3,000 inhabitants. He believes that in any such small town the quality of the service rendered will advertise itself without any other form of publicity. If the patrons are satisfied, they will communicate that fact to their neighbors and the securing of new business is, therefore, a very simple proposition. He owns a newspaper himself, but does not advertise in it because he considers it superfluous in a small town.

Electric Signs.

George E. Fuller, Federal Sign System (Electric), read a paper on "Electric Signs." This paper makes a strong plea to central stations to push the electric-sign business actively. Each sign produces more revenue than the average residence customer, even when very low rates are given to the sign patrons. The flat rate is the proper one for signs in order to keep them regularly and completely lighted and properly maintained. The company should realize that in its sign business it is selling advertising service and not merely current. This means the use of tungsten lamps, lamp renewals, cleaning and repainting of the sign and inspection of its mounting. Such service eliminates the unlit and dilapidated signs frequently observed. For such service on the flat-rate basis a good profit can be made. Still more valuable advertising service can be secured from signs where the merchants change the display matter at least once a month so as to feature special sales; this does not take nearly as much investment as one would suppose. In fact, the central station itself can even afford to undertake this added service and should employ it on its own signs. There are many other forms of electrical advertising, such as display signs operated by flashers, window signs, electric fountains, department markers, all of which are worth exploiting.

T. W. Gregory, East St. Louis, thought that the three-cent rate referred to in Mr. Fuller's paper was too low. However, he considered the paper as being full of many valuable hints for developing the sign business. He thought that it was better in many cases to sell the current to the sign company, the latter renting and maintaining the equipment.

E. W. Smith, Kewanee, makes a rate of one cent per month per watt for all signs on a flat-rate basis without maintenance. On this basis he finds that the merchant keeps up the sign properly. If he becomes negligent in this respect, he is reminded of the fact by representatives of the company.

Merchandise Sales.

C. L. Owen, Springfield Light, Heat & Power Company, read a paper on "Merchandise Sales." The new-business department, indeed the entire commercial organization of the company, should work in harmony with each other and with all other employees of the company. Weekly, or at least monthly, meetings should be held for discussion of all questions relating to the securing of new business or sale of appliances. Perfect co-operation must exist between the various departments in order to prevent blunders in soliciting. In the exploitation of appliances a good way is to have a special sale of some particular appliance each month, especially during the discount period. If there is a display window, this appliance should be the main feature thereof during this sale. The price should be reduced during this special sale and it should be advertised in the daily papers, by means of stickers on the monthly bills or other printed matter, and the original price should be restored as soon as the sales period is over. In making house-to-house campaigns it is best to specialize on one appliance for a limited time. Good local solicitors should be obtained that can cover the entire city in about 30 days. The most successful campaigns of this character are for the sale of flatirons. The straight commission basis is the best plan for remunerating the men. Tips from other employees in the organization should be followed up very closely as they very commonly lead to a service contract or the sale of some appliance. The display window and display room should be kept clean and attractive.

C. F. Westcott, Bloomington, briefly referred to the reliability of electric vehicles and of the desirability of pushing their sale, since they represent such a desirable load. A salesman must be persistent and special campaigns must be carried on with vigor. Several speakers discussed the extension of specially reduced prices beyond the special sales period and most agreed that this was not desirable. J. G. Learned said that when a campaign on any particular appliance reaches apparent saturation it is well to drop it for the time being and to take up another, particularly one that will be used for increasing the off-peak residence load.

Respecting the consumption of electric irons, H. S. Judd, of Oak Park, said that the figures given in Mr. Owen's paper, in which he stated eight hours per week as being the average use for an electric iron, as being too high. He thought that the average use perhaps only amounted to from two to three hours. G. H. Jones, Chicago, said that it is highly desirable to keep electric irons in good condition in order to keep them in service. Therefore the central-station company should maintain them. He had frequently found appliances on sale that were covered with dust, and salesrooms were sometimes found in untidy condition. They should, on the contrary, be inviting, as this in itself is a large asset. All appliance sales should be on a profitable basis or else turned over to jobbers and supply men.

Increasing Power Load of Small Companies.

David Davis, of Litchfield, read a paper entitled "How to Increase the Power Load of Small Central-Station Companies." In this he pointed out that in the average small company the manager has extremely manifold duties, and frequently the increase of the power load is an additional burden to him. Before attempting work in this line he should make a careful survey of his station conditions and the ability to carry power load. Inspection of each prospective customer's installation should be made, which in a small city is usually not a difficult undertaking. Careful data should be kept of the equipment in use. The most progressive among these prospects should be worked with first. When a proposition is brought before any prospect it must be defined. The co-operation of the manufacturers should be enlisted, as it usually is not difficult to obtain. The paper was full of very valuable hints and a more complete abstract thereof will be published in a future issue.

The discussion was begun by E. L. Brown, Elmwood, who said that the competition of gasoline engines is that which is chiefly to be met with in small cities. This can be done by checking up closely what the actual expenses and operating conditions are, being sure to take in all items. He cited a case of a grain elevator in which a 15-horsepower gasoline engine had been replaced by a 7.5-horsepower motor with material economy and much more reliable service resulting.

Municipal Pumping.

A paper written by L. H. Haynes, East St. Louis Light & Power Company, entitled "Street Lighting and Pumping for Cities and Villages" was read by T. W. Gregory, on account of the absence of the author. In the first part of this paper there is a review of the developments in electric street lighting from the old open arc to the various types of high-efficiency lamps now available, particular attention being given to the use of ornamental magnetite arc lamps. The question of electric pumping for cities is taken up, first with regard to water supply for domestic and manufacturing purposes. For such service, which is of very con-

stant character, the electrically operated pump finds a strong competitor in the compound condensing steam pump, but the low initial cost of the electric equipment can more than offset the usually higher operating cost. If some reservoir or storage facilities are available, off-peak service can be given at very low rates. Drainage pumping is by no means as desirable a load on account of its very intermittent character. However, it can be done best with electric centrifugal pumps at low investment cost, and practically without additional station equipment, so that on a readiness-to-serve basis it may be a profitable source of income. For sewage disposal electric pumps can be very well utilized. Some cities require high-pressure fire-protection pumping, which can be best furnished by means of electric multistage centrifugal pumps. This service also is very intermittent, but on a proper system of charges can be made a revenue producer.

There was no discussion of this paper on account of the lateness of the hour. A Nominating Committee, consisting of J. G. Learned, M. G. Linn, C. A. Hoppin, F. M. Sinsabaugh and David Davis, was appointed before adjournment.

Central-Station Heating.

The session on Thursday morning was opened by the consideration of the paper prepared by H. J. Frith, of Watseka, entitled "Practicability of Central-station Heating." In the absence of the author the paper was presented by title and then discussed. The paper calls attention to the value of district heating by hot water deriving its heat from the exhaust steam of an electric station. In order to be successful such a system must be well designed and constructed, it must have a load well within the capacity of the exhaust available and it requires careful operation. The paper considers each of these features in detail. The results in the Watseka plant were very good last winter, despite its severity; the income from the heating load paid for 72 per cent of the annual fuel bill. This winter the results should be still better.

The discussion of this subject hinged chiefly on the heating of hot-water tanks in residences, barber shops, etc. Rates for such service are usually too low. F. J. Baker advised against giving any such service at all, because during the greater part of the year the results are bound to be unsatisfactory—unless live steam is furnished, which is seldom warranted.

Lightning Protection of Buildings.

Ernst J. Berg, professor of electrical engineering, University of Illinois, delivered in popular style an address on "Lightning Protection of Buildings." This was inspired by many inquiries that are frequently made as to lightning rods, their value, installation, etc. Lightning is of two kinds, one of which is relatively peaceful and the other destructive. The maximum stress between a charged cloud and ground is possibly 1,000,000 volts per foot. Dr. Berg considered the constants of an element of a cloud and building each 100 feet square and 1,000 feet apart. The impedance of each foot of a lightning rod increases very rapidly with the frequency of the oscillatory discharge, and since the energy stored in a lightning discharge may amount to 11,200 kilowatt-seconds, the current that the lightning rod would have to carry at 5,000,000 cycles would be about 750,000 amperes with a drop per foot of 1,800,000 volts along the rod. Therefore at such frequencies the discharge cannot be confined to the rod. Among the conclusions that Dr. Berg has reached are that lightning rods, when well constructed, are serviceable; they do not draw lightning and perhaps can never completely protect against it. Unless they have good joints and grounds they are positively dangerous. Chimneys should have crowned rods superposed. Platinum points are not necessary. In cities lightning rods are not needed as much as in the country.

Developments in Meters.

H. W. Young, representing the Sangamo Electric Company, presented an abstract of a paper entitled "Recent Developments in Electric Meters." Among the new types described were single-phase induction meters, polyphase induction meters, large-capacity direct-current meters, electric-garage watt-hour meters, ampere-hour meters for electroplating, electric-vehicle meters employing the variable-resistor principle, distant-dial meters for stationary service, three-wire direct-current meters, portable testing meters, graphic recording meters, distant pressure recorders, etc. To give some conception of the magnitude of the meter industry, Mr. Young stated that this year the number of electric meters manufactured in this country will probably total from 800,000 to 1,000,000.

Election of Officers.

This closed the program of papers and the Association then went into a brief executive session. During this the report of the Nominating Committee was submitted and accepted. By unanimous action the election of officers for the ensuing year resulted in the choice of the following:

J. J. Frey, of Hillsboro, president.

F. H. Golding, Rockford, first vice-president.

E. MacDonald, Lincoln, second vice-president.

F. W. Reimers, Rock Island, third vice-president.

E. H. Negley, Canton, fourth vice-president.

C. W. King, Lewiston, treasurer.

H. E. Chubbuck, Peoria, secretary.

C. A. Willoughby, Peoria, assistant secretary.

W. B. McKinley, F. J. Baker, R. S. Wallace, E. W. Smith, H. A. Foster, J. J. Frey and H. E. Chubbuck, members of the Executive Committee.

Entertainments.

Entertainment features were liberally provided through a fund raised by the representatives of the manufacturers and supply men. For this service they received the gratitude of the Association and they were designated by the honorary title of "booster" on their badges.

During the convention sessions special diversions were afforded for the ladies. On Tuesday afternoon they were the guests at a vaudeville matinee party. Wednesday they were given an automobile trip to various points of interest about Peoria, including a stop at the Country Club for luncheon. Mrs. H. E. Chubbuck and Mrs. R. S. Wallace acted as chaperones for these occasions.

On Tuesday evening the annual banquet was given in the Gold Room of the Jefferson. The excellent repast, the splendid singing by Charles Burdick and his quartet, the witty remarks of Toastmaster C. W. King and the humorous and eloquent address of P. G. Rennick all served to put every one into the best of spirits. At 10:30 the floor was cleared for dancing by the more spry element among those present.

On Wednesday evening was held a very delightful parlor entertainment. This included several clever vaudeville features by the professional entertainers, Messrs. Kloer, Housten, Mack and Cy. Stebbins and was followed by an impromptu but highly entertaining minstrel show by representatives of the manufacturers and supply men under the direction of W. R. Pinckard, master of ceremonies. C. W. Wilkins acted as interlocutor, J. D. A. Cross, J. F. Hennessy, R. W. Everson and C. G. Hines as end men, and the chorus included Messrs. Benson, Dibble, Cole, Miser, Nicholson, Dineen, Hopkins, Dean, Vallette and Briscoe. Dancing concluded the festivities.

Telephone Lines in Ecuador.

The interurban telephone lines of Quito and Guayaquil in Ecuador have a length of 2,800 meters, while the telephone line which places Quito in communication with Guayaquil is 500 kilometers long.

ASSOCIATION OF RAILWAY ELECTRICAL ENGINEERS.

Annual Convention, Chicago, Ill., October 21-25, 1912.

As mentioned in our last issue, the fifth annual convention of the Association of Railway Electrical Engineers was held at the Auditorium Hotel, Chicago, October 21 to 25. An informal reception and dance was held the evening of the twenty-first, the regular business sessions starting Tuesday morning.

F. R. Frost, president of the Association, in the annual presidential address stated that the record of railway electrical engineering during the past year has been eventful and progressive along many lines. In car lighting 60 volts has been standard for practically all "head-end" service; new types of current regulators for axle devices have been brought out, giving greater adaptability to changing service conditions and the larger use of ball bearings in dynamos and further investigation of belt drives have improved axle-lighting service; new arrangements of conduit and design of special fittings have simplified conduit systems and made it practicable to install car wiring in accordance with the National Code requirements; new designs of reflectors have added efficiency and more pleasing effects to various types of illumination. Many similar improvements have been made in shop practice and in shop lighting.

The Association, he stated, has shown good results during the year and its prestige and influence are steadily increasing. Its recommendations are being generally adopted. One example of interest is the change made by several large railway systems from 110 volts to 60 volts for "head-end" service as recommended by the Association. Detailed specifications have been prepared covering car-lighting belts, incandescent lamps, wire, ball bearings for car dynamos and also for other material. These should be of considerable service to the car-lighting engineer.

In conclusion, Mr. Frost called attention to the program and thanked the various committees for their excellent work.

In the report of the secretary-treasurer it was shown that 100 new members had been enrolled during the year; also that the finances of the Association were in a sound condition.

The report of the Committee on Installation of Wiring for Electric Light and Power in Railway Shops, of which A. J. Farrelly was chairman, was then presented by Secretary Andreucetti. This is a comprehensive report outlining general approved practice in wiring various railway buildings such as round houses, shops, coal sheds, passenger stations, freight stations, etc. The full report of this Committee is published elsewhere in this issue.

In connection with the statement made in the report that the lighting fixtures in machine shops should be tungsten clusters or high-wattage units, A. J. Farrelly, of the North-Western Railway, said that the Committee did not mean to exclude all other types of illuminants from consideration. However, the general tendency is towards tungsten-filament lamps.

D. B. Pastorius, of the Pennsylvania, took exception to the recommendation that the wiring for power in machine shops should be run in conduit under the floor, and a separate circuit run direct from the panel box to each tool. He thought that as it was necessary to frequently change the position of tools in a shop the cost of construction mentioned would be excessive. He recommends dividing the shop into four sections, running an overhead circuit to each section with wires run in conduit to each machine. If this construction is used connections can easily be made for additional machines or changes.

J. Andreucetti, of the North-Western, thought the use of open wires in shops was to be discouraged. He advocates the use of a steel cabinet near the center of distribution in the shop, with branches from this box to the distributing points.

A. J. Collett, of the Union Pacific, spoke in favor of the loop system, by which the shop is divided into two sections. He advocated the use of condulets at each machine and outlet boxes at each group of machines. He recommended a fuse for each motor.

F. E. Hutchison, of the Rock Island, thought that incoming feeders should be brought to the bus bar of a main distributing panel and connections made from this to various sub-distributing panels located with reference to groups of machines. Allowance could be made in the panels for additional circuits.

C. R. Gilman, of the St. Paul, brought up the question of trouble caused by water draining into junction boxes and vertical conduit. J. Andreucetti, D. J. Cartwright and A. J. Farrelly discussed this point. Mr. Andreucetti advocated drilling holes in outlet boxes. Mr. Cartwright said that if water was the result of condensation in the conduit, wooden insulation would eliminate the difficulty; also burying the conduit in concrete would amply protect it. Mr. Farrelly agreed with Mr. Cartwright as to the use of wooden insulation.

At this point a discussion of wiring in round houses was entered into. A. J. Farrelly described rather fully the electrical construction employed at the new round house which the North-Western built at Butler. Galvanized conduit is used throughout. Headlight-type lamps are used for lighting, two being placed at the head and one at the foot of each stall. Extension cord for incandescent lamps is also provided.

J. M. Craig, of the Pennsylvania, advocated the use of open wiring for round houses due to the rapid deterioration of conduit.

J. Andreucetti explained that practically all conduit used in the new Butler round house is installed so as not to be affected by the smoke fumes.

A. J. Farrelly stated that one of the greatest protections to conduit is frequent painting.

Afternoon Session.

E. W. Jansen, of the Illinois Central, chairman of the Committee on Data and Information, presented this report at the opening of the afternoon session.

The report discusses briefly the questions of suspensions for axel-lighting equipment; belts; light failures and car-lighting statistics. In regard to the latter subject information regarding the status of electric lighting of cars was received from 58 railroads. This information shows that there are at present 13,736 electrically lighted cars in service on these roads as compared with 29,075 cars lighted by other means. Regarding the different system in use, 1,673 cars are lighted by means of the straight storage system, 481 cars have turbines, 2,073 use the head-end system and 7,100 the axel-generator system.

F. E. Hutchison opened the discussion by suggesting that members of the Association propose to the chairman of the Committee subjects upon which data is desired. This, he said, will broaden the scope of the Committee's work.

George B. Colegrove, of the Illinois Central, recommended that belts for axel-generator sets be located under the break beam, allowing at least an inch clearance.

Mr. Younger, of the Illinois Central, described tests that are being conducted on spiral belt drive for axel systems. The use of the spiral belt eliminates spring tension.

D. J. Cartwright recommended that the information collected by the Committee last year relative to car lighting be combined with the results of this year's data so that comparisons can readily be made.

The discussion of the Committee report presented at the morning session was then continued. A. J. Farrelly reported that the wiring for the Butler round house cost about $40 per stall.

E. W. Jansen stated that three 100-watt tungsten lamps per stall were found to give the best results in a newly erected round house erected by the Illinois Central Railroad at Centralia, Ill.

Mr. Schuman, a railroad contractor who was present, thought that the most important point to be considered in round-house wiring is the protection of wires from mechanical injury.

Further discussing the lighting of the Butler round house, A. J. Farrelly said that one of the greatest advantages resulting from the use of headlight-type lamps is the ease with which they are cleaned as compared with other illuminants.

The advisability of eliminating individual tool lamps in shops was a point discussed by several members. It was generally conceded that individual light is at times desirable and it was agreed that the best practice was to keep lamps and extension cord in the tool room to be drawn out by the employees when needed the same as tools.

The report of the Committee on Improvements was then presented in abstract form by H. C. Meloy, chairman. This report comprises a complete review of practically all improvements made in electrical equipment during the past year of interest to the members of the Association. The information was supplied by some 235 manufacturers of equipment. The information submitted is grouped under the following general heads: axel-lighting equipment; car lighting lamps and fixtures; shop and yard lighting; motors and power equipment; electric traction; electric headlights; ventilating equipment; and miscellaneous. The report is well illustrated with views of the equipment described.

Following this report, J. R. Sloan presented the report of the Committee on Standardizing Ball Bearings, which is a sub-committee of the Committee on Standards. This report makes eight recommendations relative to ball bearings for axle generators. The question of lubrication is also briefly discussed. Upon motion the recommendations made by the Committee were referred to letter ballot.

Wednesday Morning Session.

On Wednesday morning the report of the Committee on Improvements was briefly discussed by Edward Wray. Mr. Wray confined his remarks to the ampere-hour meter as applied to car-lighting, describing more fully a new type of meter mentioned in the report.

The report of the Committee on Train Lighting Practice was then presented by F. E. Hutchison, chairman. This Committee reports that all the advantages predicted for the 60-volt head-end system have been realized. It is universal practice with this system to have baggage men operate the equipment, these men making a report at the end of each run. The Committee presents a standard report blank to be used for this service; and also discusses briefly standard methods for cleaning batteries. The report is concluded with a number of recommendations for standardizing train-lighting practice.

C. R. Gilman opened the discussion, pointing out the advantages of the 60-volt system for head-end practice.

The question of number of cars that can be handled by two men was discussed rather fully by Messrs. McGary, Andreucetti, Cartwright and Frost. The Committee reported that two men could inspect 15 cars per 10-hour day, handling only regulators and batteries. This number seemed to be the average on all roads.

A. McGary, of the New York Central, described in detail the methods employed by his company in cleaning batteries.

E. M. Cutting, of the Southern Pacific, brought up the question of the relations of various railroads with the Pullman Company in regard to train-lighting. It was generally reported that a charge was made for all energy used in charging Pullman-car batteries.

The recommendations made by the Committee were then discussed in detail and the report finally adopted.

The report of the Committee on Shop Practice was then read by George W. Cravens. This is a very exhaustive commentary on present practice in railway shops as exemplified by the more recent installations and deals with the power plant, shop equipment and lighting. Further treatment of this report will be given in a subsequent issue.

The report was discussed briefly by D. J. Cartwright, George W. Cravens, and W. Doud. Mr. Cartwright spoke of the present tendency of railroads to purchase central-station power. He cited as an example of the rate obtained a shop having a connected load of 500 horsepower, the central station granting a rate of two cents per kilowatt-hour. Mr. Cravens thought that the advisability of purchasing power depended upon the size of the shop and the proximity of coal supply. Mr. Doud stated that the Illinois Central make a practice of purchasing all power required as the rapid growth of railroad shops makes the maintenance of a generating plant sufficiently large to take care of growth a financial burden. Further, Mr. Doud thought the generation of power for shop operation comes outside of the function of a railroad. In practically every case the Illinois Central purchases power cheaper than it could generate its own power, regardless of the location of the plant.

An interesting lecture by Ashley P. Peck, entitled "Application of Steam Turbines to Railway Shop Work," was then presented. This lecture was illustrated by lantern slides showing the wide application that is being made of steam turbines in railway shops, regardless of the size units desired. It was also brought out in the discussion of the question that the manufacturers have now practically solved the question of driving direct-current generators with steam turbines.

Following this paper, B. F. Fisher, Jr., presented a paper on the subject of "Industrial Lighting." It is pointed out by the author that much depends upon the proper lighting of a shop where eye fatigue will cause careless work and frequently result in accidents. In laying out the lighting scheme for a shop all conditions should be thoroughly studied and the total lumens necessary to be generated found. Knowing this the type of lamp best suited to the conditions should be installed. If the ceilings are high arc lamps should be used, or high candlepower incandescent lamps. In shops of moderate height smaller incandescent lamps, or mercury-vapor lamps may be found preferable. Regarding reflectors the author points out that with a spacing and mounting height suitable for concentrating or intensive type of reflector, the distributing or extensive type would give a slightly lower illumination intensity directly under the lamp, the illumination would be fairly even but a much greater amount of light would be thrown out at an angle whereas if the focusing reflector was used the light directly under the lamp would be greatly increased with comparatively large areas of low illumination intensity around this bright spot with little or no light at an agle.

In selecting a reflector due consideration should be given the gloomy appearance of ceilings when opaque reflectors are used. A reflector easily cleaned and not easily broken should always be selected.

Thursday Sessions.

The report of the Committee on Specifications was presented at the session on Thursday morning. The work of this Committee is divided among subcommittees, each in charge of a chairman. Specifications for (1) canvas belting for driving axle generators (2) purchase of incandescent lamps; and (3) wire specifications, are each handled by a sub-committee. The specifications for the purchase of incandescent lamps are divided into two parts. Part One covers the requirements to be met by the manufacturers and gives in detail the methods of inspection and test by the purchaser; Part Two gives instructions relative to the purchase and use of incandescent lamps. Part One is sub-divided into six parts as follows: General requirements; definitions and standards; method of inspection and test; physical characteristics; electrical

characteristics; schedules. The section of the report dealing with wire specifications is also divided into two parts. The first consists of Specification Forms with places for briefly filling out practically every characteristic of the wire or cable which is susceptible of tabulation. The second part consists of general specifications for all, the labor and materials entering into the manufacture of wires and cables. An appendix contains the chemical clauses of a specification for rubber insulation and the procedure for analysis to be used in connection with the specification.

This report as well as the report of the Committee on Standards presented later were discussed in detail and finally accepted.

Friday Session.

The session on Friday morning was opened with a paper on "Postal Car Lighting" by A. J. Sweet. This paper points out that no difference of opinion can exist as to the proper methods of lighting postal cars when it is taken into consideration that the construction of these cars has become standard. There are two requisites in postal car lighting that are of the utmost importance. The first is to provide illumination of such a character so as to permit the work to be carried on without eye strain. The second is that the equipment should be of such a character that the first requirement can be carried out for long hours, with maximum efficiency and with the fewest possible failures. Artistic effect, Mr. Sweet said, does not enter into the problems of postal-car lighting.

The principal features to consider are (1) avoidance of shadows; (2) avoidance of light in the eyes; (3) avoidance of specular reflection; and (4) provision for adequate intensity of illumination. Considering these points in the order named, Mr. Sweet points out that the avoidance of shadows is simple, due to the construction of postal cars. The objections to having any light in the eyes of the occupants of the cars were emphasized and recommendations made for the placing of units. Likewise the importance of a good diffused light was pointed out. Mr. Sweet stated that the intensity of light is proportional to the diffusion. An intensity between 2.25 and 3.5 foot-candles was advocated for this work.

Regarding the efficiency of the various reflectors available for use, Mr. Sweet gave the following figures: Mirror reflector, 62 per cent; prismatic, clear, 55 per cent; heavy density opal reflector, 52 per cent; aluminized metal reflector, 44 per cent; medium density opal reflector, 43 per cent; prismatic, satin finish, 40 per cent; light density, opal, 40 per cent; enameled porcelain, 40 per cent; indirect lighting reflectors, general, 25 per cent; bare lamp, 28 per cent.

Mr. Sweet considered the disadvantages of the more efficient reflectors for postal-car lighting and recommended the aluminized metal reflector, which gives 44 per cent of the total light flux generated by the lamp on the plane of illumination. The 50-watt tungsten-filament lamp was advocated in connection with this reflector, the units to be placed in a single row along the center of the car and spaced 10 feet apart.

In conclusion Mr. Sweet stated that the cost of maintenance of efficient lighting is insignificant when compared with the results obtained. He advocated cleaning reflectors outside of the car so that the service would not be interrupted.

Mr. Reed, chairman of the government's Standard Car Committee, of the Railway Mail Service outlined what steps are being taken to standardize railway postal service. The Committee of which he is chairman, co-operating with railway committees, has standardized construction specifications and floor plans for postal cars and is now working on lighting specifications. Mr. Reed pointed out the importance of efficient lighting in mail cars but stated that the greatest stress, in the specifications, will be laid on the mechanical dependability of the system installed. The Committee will perhaps demand 99 per cent efficiency and allow for only two-thirds of one per cent failures or demand an emergency or auxiliary lighting system. Mr. Reed stated that electricity and gas would be admitted on the same basis, the Committee showing no preference.

In reply to questions Mr. Reed stated that the failures would be based on car movements. A storage battery will be required on every car but no other mention will be made of the system of lighting. The specification will call for a single row of units along the center of the car. Mr. Reed could not say whether the specifications when drafted and adopted would apply to only new cars or not.

At this point Preston Millar, of New York, called attention to the publication, "Light—Its Use and Misuse," prepared under the auspices of the Illuminating Engineering Society. Copies were distributed to those present.

The Auditing Committee then reported the books of the Association to be in good condition. Chicago was again chosen for the place of the next annual meeting and Atlantic City for the semi-annual meeting.

The election of officers resulted as follows:

President, D. J. Cartwright, Lehigh Valley Railroad, Philipsburg, N. J.

First vice-president, C. R. Gilman, Chicago, Milwaukee & St. Paul Railway, Milwaukee, Wis.

Second vice-president, H. C. Meloy, Lake Shore & Michigan Southern Railway, Buffalo, N. Y.

Secretary-treasurer, Joseph A. Andreucetti, Chicago & North Western Railroad, Chicago.

Two new members of the Executive Committee were elected as follows: Willard Doud, Illinois Central Railroad, and W. A. Del Mar, New York Central & Hudson River Railroad.

Entertainment.

Elaborate entertainment features were arranged for, these being provided by the Manufacturers' Association. Monday evening an information reception and dance was held in the Assembly Hall of the Auditorium Hotel. Wednesday the ladies were entertained at a matinee party and Friday while the members were on an inspection trip to the Burnside Shops of the Illinois Central, the ladies were taken on an automobile trip.

The annual Association banquet was held on Thursday evening in the Gold Room of the Congress Hotel. Frederic P. Vose acted as toastmaster and brief remarks were made by T. Quail, of Chicago, Louis Wagner, and F. R. Frost, president of the Association. The banquet was followed by dancing.

Gift to University of Colorado.

The Ainsworth Standardizing Laboratory of the electrical school of the University of Colorado has received from W. J. Barker, general superintendent of the Denver Gas and Electric Light Company, equipment for its experimental station. Through the generosity of the Denver company the officials at the college were able to complete the set of instruments used in experimental work. The company donated a rheostat capable of carrying 200 amperes, also, six three-kilowatt transformers, a 2-kilowatt Wagner line booster and a Brush arc machine of 5,000 volts for supplying a 100-lamp circuit.

Power to Electrify Chicago Terminals.

It has been estimated that to electrify the freight traffic of the steam railways in Chicago, within what would be termed the "electric zone," would require a power output of nearly 75,000 kilowatts; this being based on a load-factor of 75 per cent.

It is estimated that the steam locomotives, within the electric zone, burn about 2,260,000 tons of coal per year, and that the ratio of coal burned with electric operation to the coal burned with steam locomotives is 1 to 2.55.

Electric Cooking in the Navy.

Electrically operated galley appliances are to be installed in all of the great new battleships of the American Navy, following a trial of such devices on the battleship *Wyoming*, which has just gone into commission.

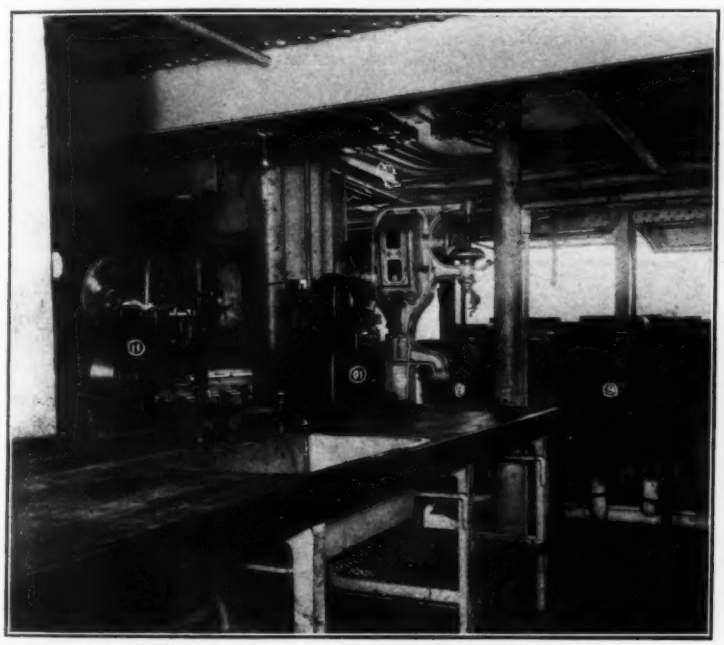
The question of sanitation enters largely into the Navy Department's reasons for adopting electricity for cooking and operating the galley labor-saving machines. By the use of electricity, coal, ashes and coal gases will be eliminated. Preparation of food, such as the peeling of vegetables, mixing of dough, etc., will all be done by machinery instead of by hand, and this will prevent perspiration from the body coming in contact with the food.

Efficiency plays a part in the department's reason for the adoption of the new devices, in that in cooking electrically the heat is produced locally, only when desired, and is instantly turned off when not required. This, together with the asbestos heat insulation used on the *Wyoming*, greatly reduces heat losses, rendering the galley and surrounding compartments more habitable. The large power demands are for short periods only, and can readily be met by the ship's dynamos, whose capacity, determined by military requirements, is always available.

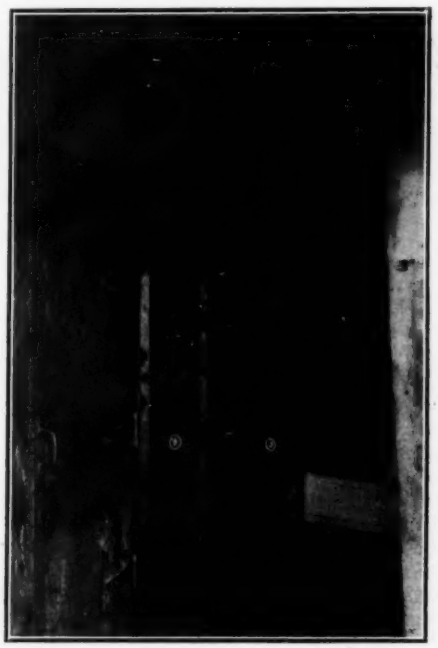
The third reason for the adoption of these devices in the Navy is based upon the consideration of convenience. The exact temperature desired for cooking may be promptly obtained and nicely regulated by switches. No smoke pipes are required, which allows greater latitude in location and arrangement of ranges and ovens. No attention to fires is required. No galley coal is required. On oil-burning ships this would otherwise have to be especially provided for.

The saving of labor, which can be otherwise employed, which will result from the use of this electrical machinery, is a fourth consideration taken into account by the officials.

The entire complement of more than 900 officers and men on a modern battleship is served by a commissary branch of approximately 13 men. The *Wyoming* has an officer's galley, with four sections of range, a crew's galley with eight sections of range, a bakery, a general mess pantry where dishes and cutlery are washed and stored, a butcher shop, and a cold-storage plant, besides other miscellaneous appliances.



Motor Applications in Ship Galley.



Electric Oven and Proofer on "Wyoming."

The *Wyoming's* electrical galley equipment operates at 120 volts, direct current, and consists of the following, which will be installed on all of the new battleships:

Electrical ranges, each section of which contains an oven, a broiler, 4 hot plates, and a switch cabinet above. The ovens reach a temperature of 500 degrees Fahrenheit within 40 minutes. The broilers attain a bright red heat within 3 minutes, and the hot plates reach 750 degrees Fahrenheit within 18 minutes. The maximum power required per section is 31 kilowatts, with all heater units in operation at full heat.

Motor-driven egg and cake machine, used for beating, stirring, creaming potatoes, etc. An assortment of whips, and a variable speed gear, are also provided. Capacity of motor, one horsepower.

Electrical meat grinder, capacity 300 pounds of raw beef or 700 pounds of raw pork per hour. Power of meter, 0.75 horsepower. In the installations of some battleships, instead of a meat grinder, a meat and food chopper, capable of mincing all sorts of food, with a meter of three horsepower, will be supplied.

Electrically driven meat slicer.

Electrically driven vegetable peeler, capable of peeling 1,000 pounds of potatoes per hour, with a wastage not exceeding 12 per cent by weight. Capacity of motor, one horsepower.

Electrical ovens, size No. 1, having a capacity of 84 24-ounce loaves per hour; No. 2, a capacity of 56 loaves. One oven of each size or two of No. 1 will be installed in the battleships. The No. 1 oven reaches 500 degrees Fahrenheit in 60 minutes, and requires 15 kilowatts on high heat and 7.5 kilowatts on low heat. Twelve pounds of bread can be baked per kilowatt-hour.

Proof box for rising dough.

Electrical dough mixer, capacity one barrel of flour; capacity of motor, three horsepower.

Electrical dish-washer, capacity 6,000 pieces washed and rinsed per hour. Steam-heated water is circulated by a propeller over the dishes, which are arranged in wire baskets. The baskets are lifted in and out of the dishwasher by a power-driven crane. Capacity of motor, one horsepower.

The new battleships will also be supplied with electrical ice-cream freezers, capacity 200 quarts in two hours. Capacity of motor, 1.5 horsepower.

New Electrical and Mechanical Appliances

Pendent Lock Guards.

The pendent lock guards shown in the accompanying illustrations have a grooved band and eye-bolt for attaching to the bead of an enameled-steel reflector. This band has a hinge connection and a catch on the opposite side for holding the guard in position. A padlock may be passed through the rim and eye-bolt for locking. The lock-

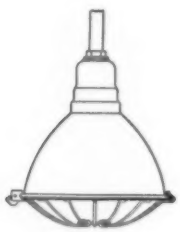


Fig. 1.

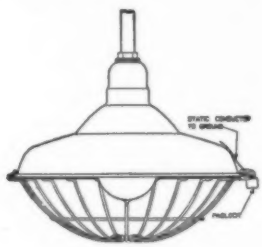


Fig. 2.

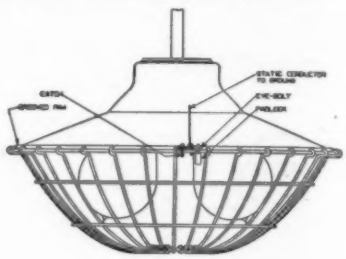


Fig. 3.

nut on the bolt furnishes a means for attaching a ground wire where it is desirable to protect lamps against static charges. Fig. 1 is a sectional view of half of the guard showing the hinge and catch. Fig. 2 shows the opposite half of the guard with hinge and method of attaching ground wire and padlock. Fig. 3 is a full front view showing very distinctly the means of locking.

These pendent guards are made by

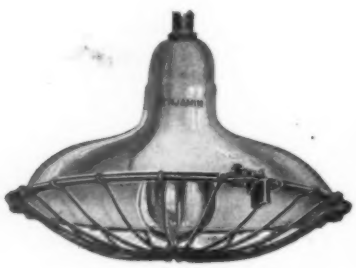


Fig. 4.

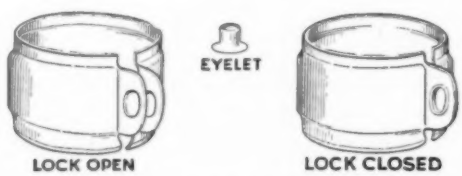
the Benjamin Electric Manufacturing Company, Chicago, Ill., and cover the entire range of Benjamin fixtures with enameled-steel reflectors. Their depth is designed with reference to the largest lamps likely to be used. The diameter of the reflector determines the diameter of the guard. The wire parts are of strong steel, tinned after welding, and the fittings are all thoroughly galvanized.

Buffalo, Rochester and Pittsburgh to Install More Telephones.

As a result of the continued successful operation of its telephone train-dispatching circuits, the Buffalo, Rochester and Pittsburgh Railway Company has decided to install additional equipment for an extension to the existing telephone lines. The entire equipment is to be furnished by the Western Electric Company, which also supplied the apparatus used in the previous installation.

There will be two separate divisions equipped, with both dispatchers located at Du Bois, Pa. One circuit will extend eastward to Clearfield, a distance of about 20 miles, and the other south to Indiana Junction and thence to Vintondale, branching off at several points. These branches go to various collieries in the anthracite-coal region, so that the total distance covered on the Indiana branch will be approximately 100 miles.

The twelve way stations on the



Parts of Mazda Lamp Lock.

Clearfield branch and the thirty on the Indiana branch will be equipped with No. 101-B selector sets containing the standard Western Electric No. 50-B selector. All trains will be equipped with portable telephone sets and line poles so that the train crew may be able to get into touch with the dispatcher from any point on the line. At sidings, wall-type telephones will be installed in concrete booths.

Plug boxes, each equipped with a cord and plug, are to be placed outside of various stations along the line. By means of these, train crews can connect their portable telephone sets to the telephone line inside the station without the use of a line pole. Storage batteries, complete with a motor-generator charging set, for furnishing talking and signaling current, as well as line construction material for about 130 miles of line, are also being furnished

Mazda Lamp Lock.

The E-Z Mazda lamp lock is designed to give insurance against theft of Mazda lamps. With this lock no keys are necessary. It is a simple device that can be slipped on the socket or

Lamp Lock Attached.

receptacle as easily as a shade holder, and cannot be removed without a special tool which can be purchased only of the maker or authorized selling agent by parties using the locks. This tool releases the lamp without the necessity of breaking it. When desired, lead seals can be attached which must be broken before the lock can be released. This lamp lock is small, compact and neat in appearance and can be finished

in any finish to match sockets or receptacles. The general sales agent is Frederick Rall, 19 Park Place, New York, N. Y.

New Adaptiboxes for Conduit Work.

The latest additions to the Adaptibox line of conduit fittings are illustrated herewith. The most important of these are the two conduit terminals or end fittings, which combine compactness with roominess in remarkable degree. They are used as conduit terminals at motors, switchboards, and starting rheostats, or to branch to or from open wiring to conduit, and can be used on flexible metal conduit when assembled with a clamp lug instead of the threaded lug as shown in the illustrations.

Fig. 1.—End Fitting.

Fig. 2.—End Fitting.

Fig. 3.—Connector Lug.

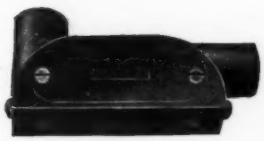


Fig. 4.—Ell, No. 4100.

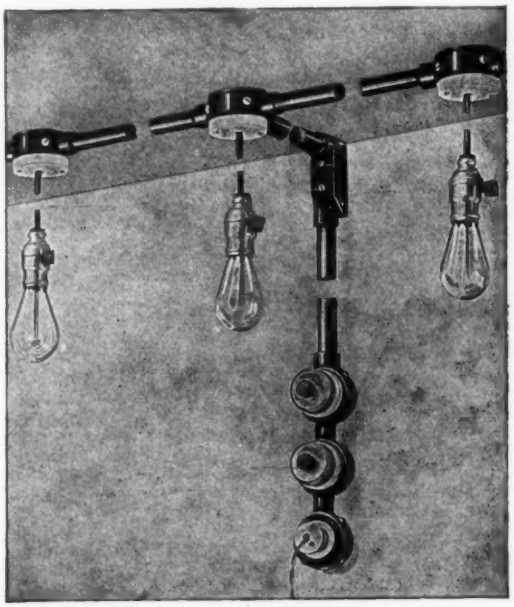


Fig. 5.—Application of Adaptibox Fittings.

Fig. 6.—Angle Lug.

Another new Adaptibox is No. 4100, which can be used as either a right-hand or left-hand ell with interchangeable countersunk plates on both sides and bottom. The lugs of this unit may be so inserted as to make either a "straight-through" or a U-shaped fitting for working around beams. Fig. 5 shows one application of this unit.

The connector lug is perhaps the best little labor saver of its kind ever devised for conduit work. Where several boxes are required close together, the usual practice requires the workman to cut thread and connect a pipe a few inches long, and such a job is just as bothersome as connecting up a full length of pipe. With the Adaptibox system, a connector lug joins two boxes in a jiffy, saving time, bringing the boxes closer and making a much neater and more workmanlike job. Fig. 5 shows three Adaptiboxes joined with connector lugs.

The angle lug speaks for itself, but the new Adaptiplate is one of those simple things that "fill a long felt want." This plate fits a four-inch box and gives the contractor the same range of standard receptacles, sockets and surface snap switches as he has available for the small boxes. It multiplies the adaptability of the Adaptibox to a remarkable degree.

Adaptiboxes make it unnecessary for the contractor to maintain large and expensive stocks in order to handle work expeditiously. The line is claimed to provide more combinations with fewer parts than any fitting heretofore offered. It is put upon the market by the Bonnell Manufacturing Company, Cleveland, O.

Gift to Wireless Society.

The Wireless Society of the Massachusetts Institute of Technology has been presented with two Holtzer-Cabot receivers of the highest grade by the manufacturers. The new apparatus will be installed and put into use immediately.

Holophane Name Resumed.

Owing to certain legal complications which occurred at the time the General Electric Company took over the Holophane Sales Department, it became necessary to use another name for the joint organization of Holophane and Fostoria lines. For this reason the word "Nelite" was adopted.

The legal obligations having been overcome, on October 21, it was decided to resume the name "Holophane," which has a reputation throughout the country for quality of both goods and service. The full name of the organization will hereafter be "Holophane Works of General Electric Company," instead of "Nelite Works of General Electric Company," as heretofore.

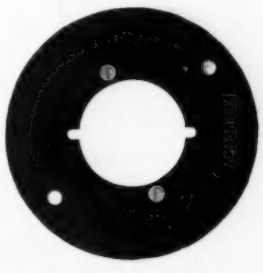


Fig. 7.—Adaptiplate.

This change, however, will not affect the different brands or trade names which the organization controls, such as Fostoria products, Iris glassware, Veluria, Holophane reflectors, Holophane-D'Olier steel reflectors, etc., which will all retain their present names.

Thirty million dollars are now invested in electric autos.

Storage-Battery Car in Boston.

The Boston, Revere Beach & Lynn Railroad, a narrow-gauge railroad extending between Boston and Lynn, Mass., a distance of ten miles, with a branch line connecting the town of Winthrop, is about to experiment with a storage-battery car with the view to the ultimate electrification of the line. The car is being built by the Federal Storage Battery Car Company and is expected to be tried out in December.

Plans have been under consideration for a terminal of the road to be constructed in the heart of Boston, the approach to be by tunnel under the harbor and city. This plan, if carried out, would render the electrification of the line imperative. At present the terminal of the road is in East Boston and passengers are ferried across the harbor to a station on the waterfront.

Small Oil Switch.

New Small Oil Switch.

The smallest oil switch manufactured by the General Electric Company for switchboard mounting is known as the type F, form K-13. It was developed particularly for use in isolated and small plants and will provide adequate protection on alternating-current circuits up to 200 amperes and 3,300 volts. The general characteristics of this switch are similar to the larger and more expensive switches for switchboard mounting made by this company.

The entire mechanism and oil tank, except operating handle on front of board are suspended from a single frame. The oil vessel is of heavy sheet-metal lines with an insulating material and provided with barriers between poles. The contacts provide two breaks in each phase and open by gravity. They are of the well know sliding-wedge construction which not only gives a wiping motion to the contacts on opening and closing, thus keeping them clean, but also protects the actual current-carrying surfaces from damage on breaking the arc. This switch is made in double, triple and four-pole forms and for non-automatic or automatic operation.

Exhibits at Convention of Railway Electrical Engineers.

A conspicuous feature of the convention was the exhibit of railway supplies conducted under the auspices of the Railway Electric Supply Manufacturers' Association. The exhibit hall was tastily decorated and several of the manufacturers made elaborate displays. The following is a brief account of the exhibits.

Adams-Bagnall Electric Company, of Cleveland, showed Jandus fans and ABolites. B. A. Stowe and C. W. Beach were in charge of the exhibit.

Adams & Westlake Company, Chicago, showed a complete line of car-lighting fixtures which were mounted on a booth representing a car. These fixtures included in all 73 different types varying in size from the small limousine lamp to the large 75-watt center deck unit. Semi indirect and concealed types for both coach and postal car lighting were also shown. G. L. Walters, R. M. Newbold, and J. W. Mercer represented the company.

American Pulley Company showed both flange and flangeless-type axle pulleys and the new steel bushings for inspection cars; also a pressed steel car wheel. M. W. Rudderow, John Forrest and C. P. Englehart represented the company.

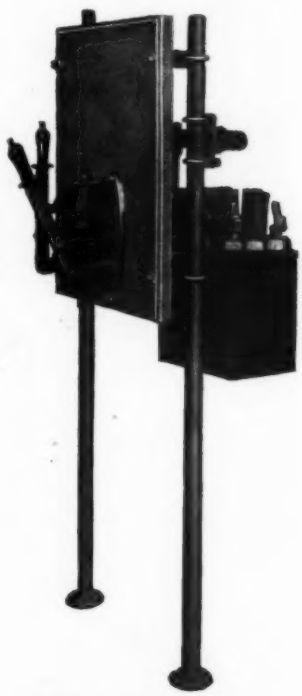
Appleton Electric Company, Chicago showed a complete line of condulets and fittings designed for electrical construction.

Benjamin Electric & Manufacturing Company showed a complete line of industrial lighting fixtures and reflector-sockets. A new feature of particular importance was the angle-type reflector-socket which may be used to advantage in certain cases where it is desired to have the maximum flux of light directed at an angle from the perpendicular. The company also showed a portable lamp guard for roundhouse and shop use which is both ground proof and of sturdy construction to withstand severe service. A new spring clamp fixture which securely grips the neck of the reflector by a twist of the cam ring was also shown. H. E. Watson, A. E. Lubeck, and G. B. Webber were in charge of the exhibit.

Central Electric Company exhibited a complete line of Columbia Lamps, Okonite wire, Opalux glassware, Diehl car fans of both ventilating and exhaust types, D. & W. Fuses, Gibbs connectors, Ralco charging plugs and connectors, Crouse-Hinds headlights and magazine fuse holders. Charles E. Brown, J. M. Lorenz and R. N. Baker were in charge of the exhibit while Messrs. Hovey and White represented the Okonite Company and C. D. Oldham represented the Columbia Incandescent Lamp Works.

Crouse Hinds Company showed a new axle-generator condulet connector for connecting axle-generator leads to the regulator circuits of the car; and changeable-side junction boxes in which a blank side plate, a one hole or a two hole side plate of any desired size may be inserted. as required. A new yard charging plug and receptacle, and battery-box condulet for mounting on battery box beneath the car were also shown. F. F. Skeel, E. G. Smith, A. F. Huels, C. H. Bissell, and C. M. Crowfoot, were in attendance.

Cutter Electric & Manufacturing Company showed a line of circuit-breakers of various types for railway, power station, and shop service. H. F. Darby and C. E. Wise were in attendance.



Oil Switch Mounted on Board.

Economy Fuse & Manufacturing Company showed a full line of refillable fuses of from 1 to 600 ampere capacity, and both 250 and 600-volt types. For purpose of demonstration the company showed the fuse with a side cut away to show the fuse links. E. L. Eustice was in charge of the exhibit.

Edison Storage Battery Company had a display of all battery parts by which each step in the process of manufacture of the battery was demonstrated. The car-lighting cells as exhibited were of the new suspension type. H. G. Thompson, F. V. McGinness, and G. F. Wakeman represented the company.

Electric Storage Battery Company showed its standard car-lighting types of chloride accumulators and Exide storage batteries. G. H. Atkins, H. E. Hunt, R. I. Baird and H. M. Beck represented the company.

Electrical Testing Laboratories had a lantern illustrating device with a large number of slides showing views of the interior of the testing laboratories, methods of testing, etc. A 3,000-watt, 2,700 candlepower tungsten lamp illuminated the booth. M. D. MacDonald and Preston S. Millar represented the company.

Esterline Company exhibited a new axle-generator type locomotive headlight equipment. The generator is very small and similar in construction to the magnetos manufactured by that company. The headlight exhibited was of the mirrored type made of green opal plate glass of special composition which gives the reflected light a peculiar golden glow. George Bell was in charge of the exhibit.

Flexible Steel Lacing Company exhibited the "Alligator" fastener for various sizes of belts. A tensile machine was provided to show the strength of the fastener and various tests were made, both on fasteners and belt samples. G. E. Purple and C. W. Beach were in charge of the exhibit.

Gereral Electric Company, exhibited a small instrument particularly adapted for testing work, motors, mercury-arc rectifiers, transformers, compression chamber lighting arresters, and new K-20 oil switch. J. Scribner, L. L. Parker, C. C. Douglas, C. H. Jones, J. L. Buchanan, F. Benson, A. Z. Hain, C. M. Langfield, and J. D. A. Cross represented the company.

George Cutter Company exhibited a five-light boulevard post, an entrance crook, street hoods, and very narrow car lighting panels, the compactness of these panels being effected by the superimposing the bus bars instead of spreading them out as usual practice. The company showed an induction-motor switch for automatically starting three-phase induction motors. O. B. Duncan was in charge of the exhibit.

Gould Coupler and Storage Battery Company exhibited its "Simplex" system including a type BB generator, regulator, type M lamp regulator and generator designed for ball bearings, all parts of which are made so as to interchange with those of present types. The company also exhibited a new plug made of lead, a 120-ampere-hour cell with pasted plates made up into standard compartment tanks with four cells per tray, a motor generator set using a standard car-lighting generator in connection with a standard 300-ampere-hour battery. George Milne, R. N. Chamberlain, George R. Berger, M. R. Shedd, Charles O. Baker, W. T. Sherman and S. W. Cowles represented the company.

Hess-Bright Manufacturing Company exhibited a large board filled with ball bearings of all sizes and capacities. A 300 pound weight was suspended from a shaft midway between two bearings; one an ordinary babbit bearing and the other a standard Hess Bright ball bearing. W. L. Batt was in charge of the exhibit.

Holophane Works of the General Electric Company exhibited new semi-indirect units and also a very attractive satin-finished reflector and prismatic-bowl combination for station lighting. The company also exhibited a new and extremely large center-deck fixture with a prismatic reflector, prismatic bowl and an opal envelope of light density, this latter installed mainly for purpose of keeping the dust off the prismatic reflector; a new hexagonal unit; also all sizes of outdoor station-lighting units in sizes from 25 to 250 watts. These have a prismatic reflector with a large opal envelope to keep the dust and water off the prismatic reflectors. A. J. Sweet, J. W. Foster, and L. C. Doane were in charge of the exhibit.

H. W. Johns-Manville exhibited a full line of fuses and service boxes. The company also showed its ebony-asbestos board for switchboards and panels, fiber conduit, friction tape and linolite lamps. E. A. Hurlbut and L. L. Cohne were in charge of the exhibit.

J. Lang Electric Company exhibited its new car-lighting panels of very narrow and compact design, and also its automatic starting device for three-phase motors. O. B. Duncan was in charge of the exhibit.

Kerite Insulated Wire & Cable Company showed a complete line of wires and cables, both plain Kerite and armored Kerite for power, submarine and car lighting work, also an especially flexible cable for use on train connectors. Azel Ames, B. L. Winchell, Jr., P. W. Miller, J. W. Young, George A. Graber represented the company.

Main Belting Company exhibited its new Laviathan special car lighting belt. The company had an operating exhibit of a motor driving a car-lighting generator arranged so as to demonstrate the adhesive properties of the belt. W. E. Fawcett was in charge of the exhibit.

National Metal Molding Company exhibited a full line of Sherardized rigged conduit, flex-steel metallic conduit and armored cable, and flex-duct non-metallic conduit. Also a full line of National Metal Molding fittings specially designed for railway car wiring, National lock nuts, bushings and outlet and switch boxes. I. A. Bennett, C. A. Abbott, H. C. Morgan represented the company.

National Electric Lamp Association exhibited a complete line of lamps for both the standard 110-volt service and 30 and 60-volt car lighting service. C. W. Bender and J. A. Hamilton were in charge of the exhibit.

Norma Company exhibited its roller bearings with a small ball bearing to take the end thrust. This bearing has an exceedingly large carrying capacity and is to a certain degree self alining. Mr. Longnickle was in charge of the exhibit.

Oneida Steel Pulley Company exhibited both its flanged and flangeless type Keystone railroad pulleys. Also a new ratchet wrench for tightening bolts on axle pulleys where there is only a slight angle to work in; and standard corrugated bushing both in the long type with bushing clamps for permanent mounting on the axle and the short type for shimming up the pulley without a bushing clamp. N. G. Stark was in charge of the exhibit.

Pass & Seymour showed a complete line of sockets and wiring devices and also showed its new Shurlock locking device and for all types of sockets which makes it impossible for the lamp to work loose or be stolen. V. R. Despard, and F. T. Haffner represented the company.

Pyle National Electric Headlight Company exhibited its new headlight with pilot-lamp attachment for use in stations, when approaching another train and at any time the intense beam of the arc is found objectionable. J. E. Kilker, H. P. Bayless, Charles W. Dake, and C. P. McGinnis represented the company.

Railway Electrical Engineer held forth in one of the booths near the entrance of the hall and conducted a general registration and information booth. George W. Cravens, M. K. Salem, and Edward Wray represented the company.

Sangamo Electric Company exhibited the resistor type ampere-hour meter mounted on a small switchboard panel with circuit-breaker as furnished to the Pennslyvania Railroad Company for axle-generator systems. Also variable shunt meters for straight-storage work and duplex-dial meters for indicating both total charge and total discharge of an axle system. J. H. Hadde represented the company.

Safety Car Heating & Lighting Company had an operating exhibit which showed the operating characteristics of the new type "F" regulators. The company also showed a new electric locomotive headlight, the big reflecting element of which was a silvered glass mirror mounted on a heavy door hinge. This company also exhibited a complete line of car lighting fixtures of all types and sizes. The company was represented at the convention by A. C. Moore, J. G. Van Winkle, G. E. Hulse, L. Schepmoes, C. E. Miller, H. H. Halm, C. A. Pinyerd, and J. H. Rodger.

S. K. F. Ball Bearing Company had an interesting and attractive exhibit of self-alining ball bearings of both radial and thrust types. G. B. Castino was in charge of the exhibit.

Thompson Electric Company showed its cut-out lamp hanger for both arc lamps and tungsten units. This hanger makes it possible to lower the lamp from any high point to the ground for cleaning, etc. A. J. Thompson was in charge of the exhibit.

U. S. Light & Heating Company exhibited its new type of S-1 panel and B-1 lamp regulator for mounting inside the car. The company showed its ball-bearing generator designed to accommodate any of the standard type bearings. A part of the generator casing was cut away to show the interior construction. The new aluminum brush holders were employed. J. A. Smith, W. A. Smith, W. L. Bliss, W. A. Turbayne, W. P. Hawley, C. C. Bradford, W. F. Bauer, L. S. Cumming, George Hentges, J. E. Widner, A. J. Mathews, R. S. Stunts, and E. B. H. Tower represented the company.

Victor Balata & Textile Belting Company exhibited the new "Axonelat" belt for car lighting work. The company also showed the raw materials from which the belt is made. Joseph Abt represented the company.

Western Electric Company exhibited a complete line of Sunbeam lamps and D. & W. fuses. The company also had some railway telephones on exhibit such as are used in the railway telephone train dispatching and auxiliary train service. George H. Porter, T. F. Ryder, H. F. MacGuyer, and A. C. Keen represented the company.

Westinghouse Electric & Manufacturing Company exhibited Westinghouse lamps and showed a case full of parts which demonstrated every step in the manufacture of the tungsten lamp from the crude tungsten ore to

the finished product. The company also showed motor control panels and reversing planer motors, long burning flame arc lamps, transformers, meters, etc. B. F. Fisher, Jr., N. W. Storer, A. J. Cole, J. H. Bryan, R. E. Schaulin, L. A. S. Wood, R. E. S. Geare, A. N. Brown, W. H. Beattys, Jr., represented the company.

Willard Storage Battery Company exhibited a unit with various parts showing plate construction, etc. W. E. Ballentine, F. S. Gassaway, C. A. Burrell, Lewis Sears represented the company.

Latest Approved Fittings

The electrical fittings illustrated and described in this department have been approved by the Underwriters' Laboratories, Incorporated, following examination and tests conducted under standards of the National Electrical Code as recommended by the National Fire Protection Association.

ATTACHMENT PLUGS, Fuseless.—Harvey Hubbell, Inc., Bridgeport, Conn.

Cap for attachment plug equipped with "Knostrain" bushing for reinforced cord, Catalog No. 5657.

Approved September 21, 1912.

CABINETS.—Cabinets shown by tests and examination conducted by Underwriters' Laboratories to be in accordance with requirements of the National Board of Fire Underwriters and examined at factories and passed by Underwriters' Laboratories, have standard labels attached to each cabinet.

The following additional manufacturers are equipped to supply these cabinets so labeled:

Oregon Welding & Mfg. Company, 305 Gilsan Street, Portland, Ore.

Approved August 13, 1912.

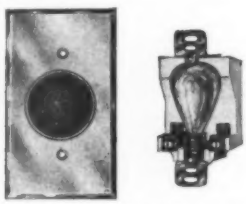
Allsteelequip Company, Aurora, Ill.

Approved August 9, 1912.

A. G. Electric & Manufacturing Company, Box 406, Seattle, Wash.

Approved August 9, 1912.

CONDUIT, FLEXIBLE STEEL.—Trenton Electric & Conduit Company, Trenton, N. J.



Bull's Eye Lamp Unit.—Bryant Electric Company.

CONDUIT BOXES. — Electrical Specialty Manufacturing Company, 51 Beaufort Street, Providence, R. I.

"Boss" Weatherproof Entrance Bushing. Threaded for attachment to conduit and with porcelain bushing for each conductor.

Approved September 30, 1912.

CONDUIT BOXES, Supports for.—The Electrical Manufacturing Company, 1951-1953 Lawrence Street, Denver, Colo.

Stamped steel brackets perforated with slots or holes for mounting bolts for conveniences in adjusting and securing cabinets and outlet boxes in walls in the position desired.

Approved September 28, 1912.

FIXTURES. — Benjamin Electric Manufacturing Company, 120-128 South Sangamon Street, Chicago, Ill.

"Benjamin" Mazda, Series Cluster, 110 and 220 volts. For use with four low-voltage large-base lamps.

Approved October 2, 1912.

FIXTURES.—F. S. Alden, 140 Boylston Street, Boston, Mass.

These devices are not completely assembled by the manufacturer at the factory. The design and construction of these fixture parts are judged suitable for the use intended, and when assembled and wired in a manner satisfactory to the inspection department having jurisdiction are approved for use.

Approved September 20, 1912.

FIXTURES.—Walter G. Warren & Company, Manufacturer, 550-552 Van Buren Street, Chicago, Ill.

Approved July 13, 1912.

FIXTURE WIRE.—B. F. Goodrich Company, Diamond Division, Akron, O.

Marking: One red and one black thread parallel in braid, with one red thread crossing.

Standard, National Electrical Code, 1911 Edition.

Approved September 25, 1912.

FIXTURE WIRE.—Detroit Insulated Wire Company, Wesson Avenue and Albert Street, Detroit, Mich.

Marking: Three uncolored cotton threads parallel with conductor, between the insulation and the braid.

Standard, National Electrical Code, 1911 Edition.

Approved September 28, 1912.

FIXTURE WIRE.—Phillips Insulated Wire Company, Pawtucket, R. I.

Marking: Two black strands woven parallel in braid.

Standard, National Electrical Code, 1911 Edition.

Approved September 25, 1912.

FLEXIBLE CORD.—B. F. Goodrich Company, Akron, Ohio.

Marking: One red and one black thread parallel in braid, with one red thread crossing.

Standard, National Electrical Code, 1911 Edition.

Approved October 2, 1912.

OZONATORS FOR AIR.—General Electric Company, Schenectady, N. Y.

"G. E." Type A-1, 250 volts, alternating current, 100 watts; Type A-5, 250 volts, alternating current, 30 watts; Type B-1, 250 volts, direct current, 150 watts.

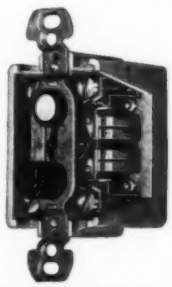
Approved October 2, 1912.

PANELBOARDS.—Drendell Electrical & Manufacturing Company, 169 Erie Street, San Francisco, Cal.

Two and three-wire, 125, 125-250 and 250 volts.

Approved October 3, 1912.

RECEPTACLES, STANDARD.—Bryant Electric Company, Bridgeport, Conn.



Push-Button Flush Switch.—The Cutler-Hammer Manufacturing Company.

Bull's-Eye Lamp Unit, Catalog No. 427.

Approved September 23, 1912.

SIGNS, ELECTRIC.—F. Fricker, 278 Pearl Street, New York, N. Y.

Approved September 19, 1912.

SWITCH BOXES.—W. D. House Electric Company, 1430 Main Street, Kansas City, Mo.

"W-D" assembled pressed-steel boxes for use with flexible tubing.

Approved September 21, 1912.

SWITCHES, PUSH-BUTTON FLUSH.—The Cutler-Hammer Manufacturing Company, Manufacturer, Milwaukee, Wis.

This company is equipped to supply Push-Button Flush Switches with standard labels.

Approved August 5, 1912.

Current Electrical News

LIGHTING AND POWER.

(Special Correspondence.)

KEOKUK, IOWA.—A "White Way" system is being promoted for the down-town district. C.

FARGO, N. D.—The Council has approved plans for extending the "White Way" on Front Street. C.

LEON, IOWA.—Merchants are considering installing a system of electroliers for four blocks. C.

VENTURA, CAL.—The Ojai Power Company has been granted an electric light franchise in this city.

DALLAS, CENTER, IOWA.—The Adel Mill Company, of Adel, will install an electric light plant here. C.

BROWN CITY, MICH.—It is proposed to bond the town for $4,000 for improving the electric light plant.

CORONA, CAL.—A new system of electric lights is to be installed by the Corona Gas & Electric Companv.

TROY, N. Y.—The Department of Public Works has decided to install a "White Way" on Forest Avenue.

HIBBING, MINN. — Incandescent lights are favored for the "White Way" system to be installed by the Water and Light Commission. C.

COLLEGE SPRINGS, IOWA.—The Lee Electric Company, of Clarinda, will install a lighting system here, and extend transmission lines. C.

ST. CATHERINES, ONT.—The City Council has decided to obtain an estimate of the cost of hydroelectric lights and power in St. Catherines.

WILKESBORO, N. C.—J. F. Humphries has secured an electric-lighting franchise in this city and has decided to construct a hydroelectric plant.

NEW ROCKFORD, N. D.—The Council has appointed a committee to secure an estimate on installing and operating a municipal electric light plant. C.

LA MOURE, N. D.—S. E. Page, of Sherborn, is figuring on installing an electric lighting plant in this city and is negotiating with the city dads to this end.

CANTON, S. D.—The Sioux Valley Power Company, has taken over the local plant and will modernize it. A dam for power will be constructed in the spring. C.

CEDARBURG, WIS.—It has been decided to issue $12,000 in bonds, the proceeds of which are to be used for improvements to the municipal lighting and power plant.

LANCASTER, WIS.—The Lancaster Light & Power Company has been incorporated with a capital stock of $2,500 by John G. Harshberger, George P. Angus and R. Meyer, Jr.

MOUNT CORY, O.—Bonds were recently sold for the purpose of securing an electric lighting system, and bids are now being asked for the erection of poles and the stringing of wires.

NEWPORT, KY.—Plans are being prepared for the erection of an ornament street-lighting system along York Street Boulevard and the Court House Square in this city. G.

BURBANK, CAL.—The Burbank Electric Light & Power Company has been granted a franchise in this city, also the right to issue 20,000 shares of stock to finance the construction.

FORT WAYNE, IND.—The Indiana Lighting Company is preparing to remodel its plant, rebuilding that portion which was burned recently. The cost of this work is estimated at $4,000.

CHATTANOOGA, TENN.—The Retail Merchants' Association will award a contract in the near future for the installation of 114 ornamental street-lighting standards along Market Street.

MUNCIE, IND.—The American Heat, Light & Power Company proposes to extend its lines to Montpelier and furnish the town with light and power. A. M. English is superintendent. S.

CRESCENT CITY, CAL.—The Mountain Power Company has applied for a certificate of public necessity and convenience to construct an electric plant in this city and to operate in Del Norte County.

MARYSVILLE, CAL.—The Marysville & Nevada Power Company is advertising for bids for running a tunnel to divert the waters of the river at Goodyear Bar for tne purpose of generating electricity.

JOHNSTOWN, PA.—Charters have been granted to the Ryder, St. Clair and Fairfield Light, Heat & Power Companies to operate in the townships of Westmoreland County. The capital stock of each is $5,000.

TOLEDO, O.—The Valley Light & Power Company has been incorporated with a capital stock of $200,000. The incorporators are Eugene Rheinfrank, W. P. Wallace, A. M. Hoover, F. W. Crabbe and F. M. Mark.

HACKETTSTOWN, N. J.—The Hackettstown Electric Lighting Company plans for the extension of its lines from Vienna to Hope, a distance of about 10 miles, and the installation of an electric-lighting service at that place. A.

PHILLIPSBURG, N. J.—The Phillipsburg Light, Heat & Power Company has been incorporated by J. L. Lomerson, T. Newman and H. Anner, with a capital of $125,000. The company will supply light, heat and power to Phillipsburg and vicinity. A.

OSWEGO, N. Y.—It is stated that the Peoples Gas & Electric Company will expend more than $30,000 in the next two months on increasing the capacity of its power plant. Considerable new machinery will be installed before the end of November.

LOUISVILLE, KY.—Jacob Greenberg, president of the Louisville Galt House Company, is in charge of plans for an electric lighting system along Main Street from First to Eighth. The system will be supplied with current from the new Galt House power plant. G.

SOMERSET, N. J.—The Somerset Light & Power Company has been incorporated to build a hydroelectric power plant on the Delaware River near Milford, Pa. The incorporators are W. K. Dupre, New York; M. V. Warner, Elizabeth, N. J.; and F. R. Garver. A.

TRENTON, N. J.—The Montana Power Company, with $3,500,000 capital stock, has been incorporated to construct and operate power plants. The incorporators are Henry F. Kroyer, of New York, George H. Burt, of Roselle, N. J., and C. Norman Fay, of Chicago.

NASHVILLE, TENN. — Chucky River Hydro-Electric Company has been incorporated with a capital stock of $25,000. The incorporators are V. M. Weaver, James L. Stewart, Noah T. Heisey, Samuel K. Varnes, of Harrisburg, Pa., and J. F. Arnold, of Green County, Tenn.

TUSCALOOSA, ALA.—Tuscaloosa Ice & Light Company has started on $50,000 worth of improvements to its system. New and heavier wires are being strung and several new circuits are planned. It is hoped to have this improvement work completed before the first of the year.

CASTLETON, N. Y.—Schodack Light & Power Corporation has been incorporated with a capital stock of $10,000 for the purpose of selling electricity. The incorporators are O. D. Woodford and Charles Van Buren, of this city, and William I. Gardinier, Schodack Landing, N. Y.

SOUTH BEND, IND.—The City Council has taken steps toward the erection and equipment of a municipal lighting plant, and the Board of Public Works has been instructed to invite bids for furnishing light for the city, so as to have a new plant installed by the time the present contract expires. S.

FREDERICKTOWN, MO.—This city will receive bids on November 6 for the construction of a municipal electric light plant. Plans and specifications may be seen in the office of the City Clerk, or may be obtained for $2.50 from the Engineers, Fuller-Coult Company, Chemical Building, St. Louis. The amount of the bond issue is $12,000.

MOORESVILLE, IND. — The Mooresville Utilities Company has acquired the properties of the Mooresville Water, Light, Heat & Power Company, the Public Service Company and the Arctic Ice Company, and decided to change the equipment from direct current to alternating current. This

company is in the market for generators, motors, transformers, meters, etc.

WESTFIELD, N. J.—The North Jersey Electric Company has been incorporated with a capital of $10,000 to dam the Delaware River near the Tri-State Monument, and to erect a hydroelectric power plant to furnish electric light and power to this vicinity. Richard Bennett, Jr., Brooklyn; W. Hayward, New York; and F. E. Sturgis, Westfield, are named as the incorporators. A.

FRESNO, CAL.—The San Joaquin Light & Power Company has entered into an agreement to erect a power line from Chowchilla, for a distance of about 10 miles, and furnish power for pumping purposes for the numerous farms in the vicinity. Simultaneous with this announcement comes the news that the United States Farm Land Company will build a railroad into the same territory. It is planned to have the motive power steam to begin with, but to convert the line to the use of electric power later.

OGDEN CITY, UTAH.—A committee consisting of A. P. Bigelow, A. T. Wright and C. R. Hollingsworth has been appointed to take up with the property owners on certain streets of the city the matter of a new system of lighting, the property owners to pay 75 cents for each foot of frontage into a fund to defray the expense of installing and lighting for a period of one year, after which time the city will assume all expense of maintaining and lighting. The system proposed is one of arc lamps supported on steel posts.

CAMDEN, N. J.—Electrical Engineers Runyon and Carey, Newark, N. J., engaged by this city to prepare plans for its proposed municipal electric-lighting plant, have submitted plans to the Special Committee of the City Council for approval. Specifications will be immediately prepared, and it is expected to make a call for bids early in January. The Council Committee has decided to install an underground-conduit system. Additional arc lights will be installed on Broadway. Raymond L. Warren is chairman of the Council Committee. A.

AUSTIN, TEX.—The Port Arthur Light & Power Company has been incorporated with a capital stock of $600,000. The incorporators are Walter N. Monroe, Charles W. Kellogg, Jr., Raymond Neilson, Jesse Andrews, C. R. Wharton, W. H. Walne, and C. L. Carter. The purpose of the company is to generate and sell electric current and power to individuals and municipalities for light, heat and power purposes, and to construct and operate power plants and substations in the state of Texas. The new company has absorbed the light and power plants of the Port Arthur Traction Company.

TOLEDO, O.—The Toledo Railways & Light Company will expend $2,000,000 for betterments and extensions in the near future, according to present plans. The concern was recently reorganized and underwritten by H. L. Doherty & Company, which will act as a holding company and is capitalized at $22,000,000. The new organization will take over the bonds, capital stock, obligations and liabilities of the Toledo Railways & Light Company, the Maumee Valley Railway & Light Company, the Toledo, Ottawa Beach & Northern railway, the Toledo & Western Railway Company, and the Adrian Street Railway Company. The new organization will assume management of the property for a period of five years.

DALLAS, TEX.—The Texas Power & Light Company has filed an amendment to its charter so as to transact business of generating and selling gas, electric current and power in the following counties: Cooke, Grayson, Fannin, Lamar, Red River, Bowie, Cass, Titus, Camp, Franklin, Hopkins, Hunt, Collin, Denton, Parker, Palo Pinto, Erath, Hood, Somervell, Comanche, Brown, Coleman, Mills, Hamilton, Coryell, Bosque, Bell, Lampasas, San Saba, McCulloch, Burnet, Tarrant, Johnson, Hill, Ellis, McLennan, Falls, Williamson, Travis, Bastrop, Robertson, Limestone, Freestone, Navarro, Henderson, Kaufman, Dallas, Van Zandt, Wood, Rains, Smith, Cherokee, Anderson, Houston, Leon, Madison, Grimes, Marion, Harrison, Gregg, Rusk, Nacogdoches and Angelina, with the intention of running high-power wires to these counties, and the counties included in the original charter.

TELEPHONE AND TELEGRAPH.

(Special Correspondence.)

RIALTO, CAL.—Bids will be received up to December 3 for a telephone and telegraph franchise in this city.

MODESTO, CAL.—The Evans Telephone Company has been granted a franchise along the public highways in the vicinity of Patterson.

WILTON, N. D.—Oscar Backman and Gabriel Thor have built a telephone line to this city and propose to form a company to extend it. C.

VACAVILLE, CAL.—H. G. Brown and associates have been granted permission to maintain a telephone line between Dixon and Maine Prairie.

PARIS, KY.—A central-energy telephone system costing $50,000 is being planned by the Cumberland Telephone & Telegraph Company, and the City Council will grant the company a franchise to buy its cables. G.

HAWESVILLE, KY.—John Webb, Frank Gaynor, G. F Lancaster and others are organizing a telephone company to build a line connecting Hawesville with the county seat. G.

FORT JARVIS, N. Y.—Announcement has been made by the Erie Railroad that it will expend $45,000 in a complete rewiring and changing of the telegraph train-handling method to a telephone system.

LAWTON, OKLA.—An Oklahoma charter has been issued to the Watora Telephone Company, with a capital stock of $2,000. The incorporators are W. A. Munson, W. J. Taylor and A. D. Young, all of Lawton. P.

SAN FRANCISCO, CAL.—The City Engineer has been instructed to prepare plans and estimates for the construction of a municipal telephone system. This must be done before the proposition to submit a bond issue of $6,000,000 for the purpose of acquiring or building such a system can go before the people.

THIEF RIVER FALLS, MINN.—This city has decided to establish a municipal telephone exchange. The Tri-State Telephone has made a proposition to the city to improve its system along the lines outlined in the plans for the municipal plant, with a proviso to sell to the city at $30,000 on 30 days' notice. C.

ELECTRIC RAILWAYS.

(Special Correspondence.)

OMAHA, NEB.—The Omaha Street Railway Company will consider an extension of its lines to Benson. C.

OGDEN, IOWA.—It is reported that the Minneapolis and St. Louis Railroad between Ogden and Frazer, will be electrified. Z.

MINNEAFOLIS, MINN.—It is rumored that the Great Northern railroad will electrify its line from here to Lake Minnetonka. C.

SAN BERNARDINO, CAL.—The Pacific Electric Railroad Company plans to expend $25,000 for additional improvements at Urbita Springs.

MADISON, WIS.—It is understood that the Southern Wisconsin Railway Company will make several extensions to its line in this city next spring.

FARGO, N. D.—The Commercial Club is working to secure the extension of the Dilworth street-car line to Detroit, Mich., a distance of about 60 miles. C.

BOGOTA, N. J.—The Town Council has passed an ordinance granting permission to the Public Service Railway Company to construct and operate an electric line on Queen Ann Road. A.

BLOOMINGTON, CAL.—The Crescent City Railroad Company has perfected its right of way between this city and Rialto, and will begin the actual work of construction immediately.

FARGO, N. D.—Negotiations have been opened by the Commercial Club with H. M. Byllesby & Company, of Chicago, looking to the construction of an interurban line between Fargo and the Detroit Lake district of Minnesota.

SHERMAN, TEX. — Preliminary steps have been taken looking to the construction of an interurban electric railway between Sherman and Gainesville *via* Whitesboro. The Fred A. Jones Company, of Dallas, is interested in the project. D.

KANSAS CITY, MO.—Thompson Brothers, of this city, plan to build an electric railway between Nevada and Lebanon. The citizens of Nevada are to furnish the right of way and a bonus of $40,000 to be paid when the line is completed.

MERCHANTVILLE, N. J.—The Public Service Railway Company has made surveys for a new line from Pensauken to East Pensauken, by way of South Union Avenue, and for private right of way east of Pensauken Avenue.

EDMONTON, ALTA.—The Edmonton Interurban Railway Company has been formed to build a line to St. Albert, a distance of six miles. The power house will be at St. Albert. Numerous other lines are projected, aggregating some 280 miles in all. C.

LOS ANGELES, CAL.—Stockholders of the San Antonio & Rio Grande Valley Interurban Railway Company have authorized a bond issue in the amount of $10,000,000, the proceeds of which are to be used in the construction of about 250 miles of additional road.

FRYEBURG, ME.—The only horse railway in New England, between Fryeburg and the Chautauqua Grove, a distance of three miles, has been acquired by James J. O'Brien, of Boston. The charter of the road allows its operation

by electricity or steam and it is reported that Mr. O'Brien will develop the property. W.

McMINNVILLE, ORE.—It is reported that officials of the Hill roads in this state have been working on plans for the direct connection of McMinnville with the Oregon electric early next year. On account of some delays in securing rights of way actual work on the construction of the road will be impossible before the first of the year.

CAMDEN, N. J.—The City Council has granted the Camden Horse Railroad Company a 50-year franchise for the construction and operation of an extension to its electric railway system. The new line will be constructed on North Fifth and Market streets, and according to terms of franchise must be in operation within one year from this month.

BESSEMER, ALA.—The Birmingham Railway, Light & Power Company has been granted a franchise to construct an electric line through the town of Brighton to the Woodward furnaces. It has not been announced just when the line will be built, but it is understood that it will be at an early date, and it is thought that when the road is built it will not stop at the furnaces.

LAPORTE, IND.—Representatives of the Murdock traction interests are projecting an interurban line from this city south to Union Center, Knox and Bass Lake in Starke county. The construction and operation of this road will afford transportation to a rich farming community and a thickly settled population. It is believed the road will be built and in operation by the middle of the next summer. S.

EAST ST. LOUIS, ILL.—The City Council has granted a franchise to the Southern Traction Company, completing plans allowing the road a right of way to the east approach of the St. Louis Free Bridge and a Belt Crossing the East St. Louis and Suburban Railway, the East St. Louis, Columbia and Waterloo Electric Railway, the Southern Railway and the Illinois Central Railroad. Z.

LOS ANGELES, CAL.—Declaring that the California main line railroad, which was incorporated in February of this year under the name of the California Air Line Railroad Company, is ready and willing to finance construction of the municipal railway to the Harbor for the city, Attorney Glen Behymer, of Behymer & Craig, has filed an order with the City Council to construct and operate the road.

BOSTON, MASS.—Stockholders of the New York, New Haven & Hartford Railroad Company have voted to issue $8,000,000 bonds to carry out plans for electrifying the Boston and Providence Division. It is reported that plans and estimates will soon be drawn up, and that installation will be begun at an early date. This will leave only the road between Providence and New Haven without provision for electrification, since the contracts call for the electrification of the road from Stamford to New Haven before May 1, 1913. The appropriation will cover the elimination of all grade crossings, and the continuation of the four-track roadbed from Readville to Providence, the erection of a power house at Providence, and the use of the same system and character of equipment as is now used by the New Haven between New York and Stamford are contemplated. W.

FINANCIAL NOTES.

Expansion in business and activity at industrial centers continue unabated. The favorable weather conditions indicate the harvesting of record-breaking crops with consequent big business for the railroads of the country. This presages a continued demand for improvement in equipment and a sustained price development. A healthy indication upon the part of large operators is the maintaining of copper prices on a steady level notwithstanding the temptation to take temporary advantage of the big demand both at home and abroad.

At a special meeting of the stockholders of the American Railways Company the proposed issue of $4,000,000 seven-per-cent new preferred stock was approved, 105,000 shares being voted in favor and 4,034 against, out of a possible total of 135,000 shares. Of the new stock $2,000,000 is to be presently issued, stockholders to be given the opportunity to subscribe pro rata.

San Francisco advices state that the United Railroads Company has made arrangements with local investment houses to refinance the underlying bonds which mature on January 1, 1913. On that date $350,000 Park and Cliffhouse Railway six-per-cent bonds mature, as well as $3,000,000 of bonds of the Market Street Cable Company. Of the latter $1,200,000 have been purchased for sinking fund, leaving $1,800,000 to be provided for.

Stockholders of the Puget Sound Traction, Light & Power Company, a Massachusetts corporation, voted to authorize issue of $1,136,400 of unissued preferred, to be offered shareholders at par. Each share of existing stock preferred and common, of record October 16, carries one right, and 25 rights are necessary to secure one new share. Subscriptions will will not be received later than December 2.

The Racine Gas Light Company, Kenosha Gas & Electric Company, and Kenosha Electric Railway Company, recently acquired by the North American public service interest, have been merged into a $2,000,000 corporation, known as the Wisconsin Gas & Electric Company. J. D. Mortimer, president of the companies, and general manager of the Milwaukee Electric Railway & Light Company, and allied corporations, states that the merger was effected and the capitalization increased in order to provide simpler means of management and obtaining funds for construction purposes. It is proposed to expend more than $250,000 during 1913 in new work of all kinds at Racine and Kenosha.

A contract has been entered between the directors of Riverside (Cal.) Water Company and Goodwin, Garby & Holton, of San Francisco, whereby the company is financed for a period of one year for the sum of $600,000. The company is to be allowed the right to rebond for the same amount for a period of 20 years from October 1, 1913. This contract, of course, is dependent upon its sanction by the State Railroad Commission and the approval of the attorneys for the water company. The making of such a contract at this time was quite important for the company because the time in which it might refund its bonds had expired. and the city government had not completed its negotiations for taking over its water system. With the approval of this contract the money will be paid immediately into the treasury and bonds amounting to $750,000 will be accepted as security.

The Shreveport Traction Company has sold $1,000,000 25-year five-per-cent bonds to the Hibernia Bank & Trust Company, of New Orleans.

A contract has been signed here whereby the gas, electric, water and ice properties in Abilene, heretofore operated by the Abilene Light & Water Company, the Abilene Gas, Light, Fuel & Power Company and the Abilene Ice Company, have been acquired by N. W. Halsey Company, of New York, for $600,000. The present plans call for $100,000 to be spent in improvements. These are the first public utility plants purchased by this firm in Texas, although they control a large number in the Eastern and Central States, also the Pacific Gas Electric Company of San Francisco.

Dividends.

Cape Breton Electric Company; the regular semi-annual dividends of $3 a share on the preferred stock and $2 a share on the common stock, also an extra dividend of $1 a share on the latter, all payable November 1 to holders of record October 25.

Detroit United Railway; the regular quarterly dividend of 1.25 per cent, payable December 2 to stock of record November 15.

Eastern Pennsylvania Power Company; a regular quarterly dividend of 1.75 per cent on the preferred stock, payable November 1 to stock of record October 28.

Edison Electric Illuminating Company of Brockton; a semi-annual dividend of $4 per share, payable November 1 to stock of record October 24.

Lowell (Mass.) Electric Light Corporation; a dividend of $2 a share, payable November 1 to stock of record October 23.

Montreal Light, Heat Power Company; a quarterly dividend of 2.25 per cent, payable November 15 to stock of record October 31.

Ohio Traction Company; a quarterly dividend of 1.25 per cent, payable November 1 to stock of record, October 26.

Sierra Pacific Electric Company; a regular quarterly dividend of $1.50 a share on the preferred stock, payable November 1 to stock of record October 16.

Tampa (Fla.) Electric Company; a dividend of $2.50 a share, payable November 15 to stock of record November 1.

Texas Power & Light Company; the regular quarterly dividend of 1.75 per cent on the preferred stock, payable November 1 to stock of record Oct. 25.

United Railways & Electric Company; a semi-annual dividend of 1.5 per cent, payable November 12 to stock of record November 2.

West Penn Railways Company; a regular quarterly dividend of 1.25 per cent on the preferred stock, payable November 1 to stock of record October 28.

Washington-Virginia Railway Company; a semi-annual common dividend of 1.5 per cent, and a preferred dividend of two per cent, payable November 1.

Reports of Earnings.

AMERICAN LIGHT & TRACTION.

The American Light & Traction Company, for September, 1912, the nine months ended September 30, 1912, and the twelve months ended September 30, 1912, reports earnings as follows:

	1912	1911
September gross .....$	375,547	$ 346,371
September net	366,515	337,280
Nine months' gross....	2,972,647	2,925,702
Nine months' net.....	2,883,851	2,841,834
Twelve months' gross.	4,190,997	4,105,097
Twelve months' net...	4,072,259	3,990,964

NEW ORLEANS RAILWAY & LIGHT.

The New Orleans Railway & Light Company reports for the nine months ended September 30, 1912, compared as follows:

	1912	1911
Gross	$4,878,980	$4,669,255
Net, after taxes	1,898,705	1,709,902
Surplus after charges.	650,916	490,875

MEXICAN TELEPHONE & TELEGRAPH.

The Mexican Telephone & Telegraph Co. reports for six months ended August 31, 1912, as follows:

(Mexican Currency.)		
Gross	348,187	312,215
Expenses	166,341	158,325
Net	181,846	153,890

LONDON UNDERGROUND.

The following roads have reported weekly gross earnings:

	1912	1911
London Underground (Metropolitan District):		
Week ending Oct. 12	£ 13,334	£ 12,012
July 1-Oct. 12	180,115	164,986
London Underground (Tubes):		
Week ending Oct. 12	£ 14,380	£ 13,730
July 1-Oct. 12.	186,075	180,380
London Underground (London Tramways):		United
Week ending Oct. 12	£ 5,828	£ 5,939
July 1-Oct. 12	99,900	109,322
London Underground (London Bus):		General
Week ending Oct. 12	£ 56,270	£ 39,752
July 1-Oct. 12	855,244	600,679

AMERICAN TELEPHONE.

The American Telephone & Telegraph Company reports a surplus after dividends for nine months ended September 30, 1912, of $4,275,758, against $4,131,457 in the corresponding period a year ago. Following is the income account for the period named, with comparisons:

	1912	1911
Dividends	$17,670,133	$15,438,090
Interest and other rev.	9,278,780	7,777,934
Tel. traffic	4,013,917	3,588,289
Real estate	53,057	69,682
Other sources	257,973	423,697
Total revenue	31,273,860	27,297,994
Expenses	3,500,666	2,673,204
Net revenue	27,773,194	24,624,789
Surplus	23,596,589	20,417,366
Dividends	19,320,830	16,285,908
Surplus	3,275,758	4,131,457

The American Telephone & Telegraph Company and associated holdings and operating companies in the United States, not including connecting independent or sub-license companies, report for the eight months ended August 31, 1912, with all duplications excluded, compares as follows:

	1912.	Increase.
Gross revenue	$129,615,075	$12,107,231
Expenses and taxes.	49,112,027	3,433,001
Balance	80,503,048	8,674,230
Maint. and deprec'n.	43,123,210	5,237,907
Net revenue	37,379,838	3,436,333
Interest	9,073,075	*56,875
Net income	28,306,763	3,493,208
Dividends	19,429,417	2,464,177
Surplus	8,877,346	1,029,031

* Decrease.

OREGON ELECTRIC RAILWAY.

The report of the Oregon Electric Railway Company for the year ended June 30, 1912, shows net earnings of $306,942, against $292,567 in 1911. The income account compares as follows:

	1912	1911
Total operating revenut	$787,476	$616,079
Total operating expenses	480,533	323,512
Net operating revenue	$306,912	$292,567
Taxes	47,440	30,403
Operating income	$259,503	$262,164
Other income	4,278	5,239
Total income	$263,780	$267,404
Interest on bonds	116,483	100,000
Surplus	$147,297	$167,404

AURORA, ELGIN & CHICAGO RAILROAD.

The Aurora, Elgin & Chicago Railroad reports as follows for September and three months ended September 30:

	1912	1911
September gross	$182,851	$167,422
Net after taxes	83,758	79,064
Surplus after charges	51,638	47,753
3 months' gross	573,750	542,975
Net after taxes	269,426	262,428
Surplus after charges	170,631	166,101

UNITED TRACTION OF ALBANY AND TROY.

The United Traction Co. (Albany-Troy) reports to the up-state New York Public Service Commission, for the quarter ended June 30, 1912, compared as follows:

	1912	1911
Gross	$606,151	$583,971
Net after taxes	160,270	215,538
Other income	53,631	50,721
Total income	213,901	266,259
Surplus after charges	105,832	163,789

NEW YORK STATE RAILWAYS.

The report of the New York State Railways to the up-state New York Public Service Commission for the quarter ended June 30, 1912, compares as follows:

	1912	1911
Gross	$970,882	$911,028
Net after taxes	270,051	331,418
Other income	452,419	138,686
Total income	542,419	470,105
Surplus after charges	302,263	320,795

MOUNTAIN STATES TELEPHONE.

The Mountain States Telephone Co. reports for the three months ended August 31, 1912, as follows:

Gross earnings	$1,744,968
Net earnings	637,487
Dividends (3 months)	396,946
Surplus	240,541

PACIFIC POWER EARNINGS.

The report of the Pacific Power & Light Company for the year ended September 30, 1912, shows net earnings of $608,173, against $556,228 in 1911. The income statement for September and for the fiscal year compares as follows:

For September:	1912	1911
Gross earnings	$ 111,953	$ 108,647
Net earnings	57,095	50,979
Surplus over charges	32,681	19,386
Twelve months:		
Gross earnings	$1,223,769	$1,187,684
Net earnings	608,173	556,228
Surplus over charges	296,826	253,745
Surplus over preferred & 2d pref. dividends	113,076	166,245

The Kings County Electric Light & Power Company and the Edison Electric Illuminating Company of Brooklyn show comparative combined earnings and expenses for September, 1912, and for nine months, as follows:

		1912	1911
Gross Operating revenue		$401,617.30	$371,789.09
Operating expenses excepting taxes and depreciation charges	$186,628.00		166,162.73
Taxes	34,500.00		30,000.00
Depreciation charges	62,088.76		46,621.02
Total operating expenses		283,216.76	242,783.75
Net operating revenues		118,400.54	129,005.34
Non-operating revenues		932.10	6,454.25
		119,332.64	135,459.59
Bond discount written off		1,689.07	1,689.07
		117,643.57	133,770.52
Fixed charges-bond interest		70,546.66	70,546.66
Profit and loss surplus for the month		47,096.91	63,223.86

JANUARY 1 TO SEPTEMBER 30, INCLUSIVE.

		1912	1911
Gross operating revenue		$3,767,514.33	$3,396,377.09
Operating expenses excepting taxes and depreciation charges	$1,612,576.03		1,447,267.89
Taxes	309,500.00		290,000.00
Depreciation charges	534,529.82		417,948.48
Total operating expenses		2,456,605.85	2,155,216.37
Net operating revenues		1,310,908.48	1,241,160.72
Non-operating revenues		30,795.31	51,095.78
		1,341,703.79	1,292,256.59
Bond discount written off		15,201.63	15,201.63
		1,326,502.16	1,277,054.87
Fixed charges		634,920.00	593,129.40
Profit and loss surplus for the nine months		691,582.16	683,925.47

CLOSING BID PRICES FOR ELECTRICAL SECURITIES ON THE LEADING EXCHANGES AS COMPARED WITH THE PREVIOUS WEEK.

	Oct. 28.	Oct. 21
American Tel. & Tel. (New York)	142¾	146¾
Commonwealth Edison (Chicago)	144	138
Edison Electric Illuminating (Boston)	273¾	274
Electric Company of America (Philadelphia)	*12¼	*12¼
Electric Storage Battery common (Philadelphia)	55¼	56¼
Electric Storage Battery preferred (Philadelphia)	55¼	56¼
General Electric (New York)	180⅛	182
Kings County Electric (New York)	129	129
Manhattan Transit (New York)	2	1¾
Massachusetts Electric common (Boston)	19	19
Massachusetts Electric preferred (Boston)	77	*79
National Carbon common (Chicago)	129	129
National Carbon preferred (Chicago)	120	120
New England Telephone (Boston)	149½	150
Philadelphia Electric (Philadelphia)	23	23⅜
Postal Telegraph and Cables common (New York)	83¾	84
Postal Telegraph and Cables preferred (New York)	67½	67½
Western Union (New York)	79¾	80½
Westinghouse common (New York)	82¾	84¾
Westinghouse preferred (New York)	122½	*122⅛

*Last price quoted.

PERSONAL MENTION.

OLIN J. FERGUSON, of Union College, has become head of the electrical engineering department at the University of Nebraska.

WALTER L. UPSON, formerly of the University of Vermont, has been appointed associate professor of electrical engineering in Union University, Schenectady, N. Y.

CHARLES O. BAKER, formerly manager of the Wheeler Reflector Company, of Boston, has recently become connected with the Gould Coupler Company and the Gould Storage Battery Company.

HERBERT A. FAULKNER has been elected secretary of the New England Street Railway Club, Boston, Mass., to succeed John A. Lane, who has served in this capacity for the past ten years and recently resigned on account of illness.

FREDERICK A. De LAY, professor of electrical engineering in Colorado Agricultural College, recently gave two illustrated lectures on electricity at the Y. M. C. A. rooms, Dayton, O. The first lecture was of a practical nature, the other dealt with the character of electricity.

H. RUSSELL STICKNEY has just been promoted to the position of assistant electrician of the Fred T. Levy Company, which is building a big power plant on the Housatonic River in Connecticut. Mr. Stickney is a graduate of the Pratt Institute, Brooklyn, and only entered the employ of the Levy Company a few weeks ago.

CHAUNCEY L. WILLIAMS has resigned as western manager of the *Electrical World*, with headquarters in the Old Colony Building, Chicago, Ill., and will move to New York City to take up other work. Mr. Williams has made many friends in the electrical field, and his departure from Chicago will be a source of regret to a host of good friends and acquaintances who will wish him the success that his genial bearing, enterprise and business integrity entitle him to.

J. L. CRIDER, who has been general superintendent of construction of the Oakland & Antioch Railroad, which J. G. White & Company has under construction in California, has now been placed in general charge of the construction of the Oakland, Antioch & Eastern in addition to his duties with the first named road. C. H. Quimby, who has been in charge of several important construction projects for J. G. White & Company in the East, has been sent to the Pacific Coast as assistant to Mr. Crider.

R. J. GRAF, of H. M. Byllesby & Company, has been appointed by that company to the Chicago secretaryship of the Louisville Gas Company and the Louisville Lighting Company, twin service corporations in Louisville, Ky. Mr. Graf is to have permanent offices in Chicago, where the meetings of the directorates of the two companies are to be held hereafter. M. A. Morrison, of Chicago, will assist Mr. Graf. Fred A. Nobbe and T. B. Wilson, respectively Louisville secretaries of the two Gateway City companies in the past, are to retain assistant secretaryships, with offices in Louisville, under the new arrangement.

LEONARD H. KINNARD, formerly general commercial superintendent of the Bell Telephone Company of Pennsylvania and its associated companies, has been elected second vice-president and general manager of the company, succeeding P. L. Spalding, who recently resigned to become president of the New England Telephone and Telegraph Company. Mr. Kinnard will be resident manager at Philadelphia, Pa. Heron Crosman, Jr., formerly division manager of the Bell Telephone Company at Harrisburg, Pa., has been elected to succeed Mr. Kinnard as general commercial superintendent of the company.

MICHAEL J. GANLEY, night emergency foreman of the Brooklyn Company Section of the National Electric Light Association, which is an organization of the employees of the Brooklyn Edison Company, has been awarded the first "distinguished service medal" ever given by the company. Some time ago the company decided to award a "distinguished service medal" to employees who risked their lives in order to save the lives of others, and Mr. Ganley, on June 22, 1908, at the risk of his own life, entered a manhole from which flames caused by a short circuit were issuing, and saved the life of Michael O'Donnell.

OBITUARY.

JOHN McKINLOCK, 79 years old, died at his apartments, 45 East Twenty-ninth Street, Chicago, Ill., on October 28. Captain McKinlock was born in New York City. At the outbreak of the Civil War he mustered three companies, going out with the last one, the One Hundred and Forty-seventh New York, as captain. He was in the principal battles of the army of the Potomac, on General Paul's staff at the battles of the army of the Potomac, on General Paul's staff at the battle of Gettysburg, with General Grant at Appomattox, and participated in the grand review at Washington. Captain McKinlock is survived by five children, Walter C., of New London, Conn., George A., president of the Central Electric Company, Chicago, Ill.; William H., president of the Metropolitan Electrical Supply Company, Chicago, Ill.; Dr. John McKinlock, Chicago, Ill.; and Mrs. Charles E. Sharp of St. Louis, Mo.

NEW PUBLICATIONS.

THE EXCAVATING ENGINEER. —*The Steam Shovel News* has, with the October number, which is the first of Vol. IX, changed its name to *The Excavating Engineer*, which will hereafter be issued with Frank G. Bolles as manager and editor. The publication office is in Milwaukee, Wis.

THE MARCONIGRAPH. — An American publication with this title, which is the same as that of the English publication which has been in the field for over one year, will appear monthly, beginning with October of this year. It is published by the Marconi Publishing Company, 456 Fourth Avenue, New York City. The editor is J. Andrew White.

ELECTRIC RAILWAY CONVENTION SOUVENIR.—*Electric Traction*, Chicago, is distributing as a souvenir of the recent electric railway convention held at Chicago, a large poster illuminated with half-tone portraits of George H. Harries, president of the American Electric Railway Association, the presidents of the allied associations, and line sketches of some of the leading manufacturers and supply men.

COKING OF COAL.—Bulletin No. 60 of the University of Illinois, entitled, "The Coking of Coal at Low Temperatures," by S. W. Parr and H. L. Olin, has just been issued. This reports the results of experiments on various types of Illinois coal with reference to the principles which govern their use in the production of coke. The temperatures used did not exceed approximately 750 degrees Fahrenheit. Reference is also made to the by-products obtained at the temperatures employed.

PROPOSALS.

ARC-LIGHTING SYSTEM.—Sealed proposals will be received at the office of the United States Engineer until November 19, Detroit, Mich., for an arc lighting system at Sault Ste Marie, Mich. Further information will be furnished upon application.

DIRECT-CURRENT NON-REVERSIBLE MOTORS.—Sealed proposals will be received by the Navy Department, Bureau of Supplies and Accounts, Washington, D. C., until November 26 for four direct-current, non-reversible motors for delivery at the Navy Yard, Newport, R. I., as per Schedule No. 4934.

ELECTRIC PASSENGER ELEVATORS.—Sealed proposals will be received at the office of the Supervising Architect, Washington, D. C., until November 23 for the installation complete of an electric passenger elevator in the post office at Washington, N. C., and until November 25 for an electric passenger elevator in the post office at Roswell, N. M., in accordance with the drawings and specifications, copies of which may be had from the office of the Supervising Architect.

ELECTRIC CONDUITS AND WIRING AND INTERIOR LIGHTING FIXTURES.—Sealed proposals will be received at the office of the Supervising Architect, Washington, D. C., until December 6 for the electric conduits and wiring and interior lighting fixtures of a three-story building for the post office at McAlester, Okla.; and until December 23 of a one-story building for the post office at Crowley, La., in accordance with drawings and specifications, copies of which may be had from the office of the Supervising Architect.

NEW INCORPORATIONS.

ROCHESTER, N. Y.—Electric Supply Sales Company has been incorporated with a capital stock of $5,000. The incorporators are Howard M. Van Demark, Willis R. Van Demark and F. E. Burns, all of this city.

CLEVELAND, O.—The Hale-Christy Company has been incorporated with a capital stock of $3,000 to deal in electrical and mechanical devices. The incorporators are Willis W. Hale, Neal G. Gray, C. J. Peck, Leroy Christy and W. B. Hale.

HAMBURG, N. Y.—Inter-Village Electric Corporation has been incorporated with a capital stock of $25,000. The incorporators are Christopher M. Baldy and Charles H. Taylor, Buffalo, N. Y.; and Charles H. Taylor, Williamsville, N. Y.

CHICAGO, ILL.—The Electric Motor Chair Company has been incorporated with a capital stock of $50,000 to manufacture and deal in motor and

manually propelled wheel chairs, etc. The incorporators are C. B. Chrysler, C. G. Trayer and J. G. Bennett. Z.

TOLEDO, O.—The Joseph L. Skeldon Engineering Company has been incorporated with a capital stock of $10,000 to engage in the business of power plants, waterworks systems, heating and lighting equipment. The incorporators are Joseph L. Skeldon, David F. Skeldon, W. C. Griffin, Alma Haynes and Claud Rogers.

EDWARDSVILLE, ILL.—The Dunlap-Dippoid Company has been incorporated with a capital stock of $20,000 to do a general construction business of railways, power plants, etc. The incorporators are Orie T. Dunlap, John E. Dippoid and Clara B. Dunlap. Z.

DAYTON, O.—Negotiations are pending for the purchase of the Apple Electric Company by a New York corporation. This company has just secured a patent on a system for electric lighting and starting of automobiles which it is claimed will revolutionize the business. The Apple Company was organized five years ago and manufactures electrical devices and auto lighting systems. H.

DATES AHEAD.

Electrical Supply Jobbers' Association, Hot Springs, Va., November 13-15.

Association of Telephone Pioneers of America. Annual convention, New York City, November 14-15.

Alabama Light and Traction Association. Birmingham, Ala., November 14-15.

American Mining Congress. Fifteenth annual meeting. Spokane, Wash., November 25-28.

American Society of Mechanical Engineers. Annual meeting, New York, N. Y., December 3-6.

American Institute of Chemical Engineers. Annual meeting, Detroit, Mich., December 4-6.

American Association for Advancement of Science and affiliated societies. Annual meeting, Cleveland, O., December 30-January 4, 1913.

Electrical Contractors' Association of New York State. Annual meeting, Syracuse, N. Y., January 21, 1913.

Western Association of Electrical Inspectors, Annual meeting, St. Louis, Mo., January 28-30, 1913.

With the Electrical Manufacturers

Franks Manufacturing Company, Rock Island, Ill., is sending out to the trade its new and beautifully illustrated catalog.

Bridgeport Brass Company, Bridgeport, Conn., has issued a folder calling attention in a striking manner to the durability and other advantages of its Phono-Electric trolley wire.

The Dale Company, New York City, has issued catalog No. 17 of its lighting fixtures and specialties. This shows some 400 designs of electrolier, bracket and special fixtures, portables, combinations, reflectors, fixture parts, wireless clusters, etc. Among these are designs to suit practically every taste and need.

The Terry Steam Turbine Company, Hartford, Conn., has issued an artistic booklet entitled "Terry Turbines Handle Peak Loads." On the frontispiece is a picture of Fujiyama, Japan's famous volcanic peak. The booklet includes a description of the Terry turbine construction, some of the uses for which the turbines are adapted and a partial list of users.

Standard Underground Cable Company of Canada, Hamilton, Ont., has issued a booklet describing Sterling rubber-insulated wire and cable. The booklet has illustrations not only of the company's products, but of various buildings in which they have been installed, and also of the manufacturing plants at Hamilton and at Perth Amboy, N. J. A list of other installations is given.

H. Tinsley & Company, London, England, has issued a price list of recoils, potentiometers, galvanometers, keys and similar apparatus, including such specialties as a phase-shifting transformer. This firm handles a number of apparatus devised by Dr. Drysdale, including an alternating-current potentiometer, non-inductive shunts, vibration galvanometer, wattmeter, regenerative dynamometer brake and stroboscope.

Edison Storage Battery Company, Orange, N. J., has prepared a valuable and handsomely bound loose-leaf data book containing detailed descriptions, many illustrations and complete data of the various sizes of the new Edison storage battery. There are given a very large number of curves showing various characteristics of the battery in normal and many abnormal conditions. These show the remarkable vigor of the battery even under extreme abuse.

The Deane Steam Pump Company, 115 Broadway, New York, N. Y., has issued three new bulletins. Bulletin D 219 describes modern water works for town and city supply; among these are some electrically driven sets. Bulletin D 222 is devoted to automatic pumps and receivers, both steam and electrically driven and of the simplex, duplex and triplex types. Bulletin No. 224 describes horizontal, double-acting, single-cylinder power pumps which may be operated by electric motors or prime movers.

The Railway & Industrial Engineering Company, Peoples' Bank Building, Pittsburgh, Pa., has issued bulletin No. 8, which describes and illustrates the Burke high-voltage air-break switches, horn-type lightning arresters and horn-type fuses. The switches are designed for opening loaded circuits and have successfully withstood severe short-circuits. The arresters are of the improved horn-gap type. All of this Burke equipment has been tried out under severe conditions with excellent results.

Joseph Dixon Crucible Company, Jersey City, N. J., has made the following changes in its officers and board of directors on account of the death of the vice-president, William H. Corbin. George E. Long, formerly treasurer, has been elected vice-president, and J. H. Schermerhorn, formerly assistant treasurer and assistant secretary, was elected treasurer and made a member of the board of directors. Albert Norris was elected to the office of assistant secretary and assistant treasurer.

Kuhlman Electric Company, Elkhart, Ind., has issued two new folders calling attention to its pipe-throwing and pole type transformers. The former are made for variable secondary voltage, the adjustment being from 5 to 50 volts; they have been found very serviceable in relieving frozen water pipes. The new pole type transformers were designed to meet the demand for a high-tension outdoor transformer; they can be installed like any pole transformer and are made in sizes of 5 to 50 kilowatts and for any voltage up to 22,000.

The Century Electric Company, St. Louis, Mo., turned over a large portion of its new factory building on Wednesday, October 23, for a meeting of 400 of its workmen to listen to an address by Charles W. Fairbanks on some of the important questions of the day. The Century Company has planned this innovation so that its employees may have the benefit of listening to prominent speakers in the hope that they may be guided to an intelligent expression with regard to the exercise of their voting power.

Reynolds Electric Flasher Manufacturing Company, 617 West Jackson Boulevard, Chicago, Ill., has issued Bulletin No. 22 describing colored lamp hoods for electric-sign bulbs. These are said to be much more satisfactory than stained or dipped lamps, as they last for years. The Reco hood slips over the lamp bulb easily and is securely held in place by a strong yet flexible and noncorrosive phosphor-bronze spring. The hoods are supplied in ruby, green, opal, amber and blue. Frosted and clear-glass hoods can also be supplied for sign manufacturers who desire to make their own color combination for signs.

The Westinghouse Electric & Manufacturing Company has closed an order with the Pacific Light & Power Company, Los Angeles, Cal., for electrical apparatus totaling $350,000 in value. The order includes two 17,500-kilowatt, 6,600-volt three-phase waterwheel-type generators; one 200-kilowatt motor-generator set; one 6,600-kilowatt, 6,600-volt, synchronous condenser, together with a quantity of auxiliary apparatus. The apparatus is for use in a water-power plant near Fresno, Cal., and the

power generated will be transmitted to two substations, located 135 miles and 275 miles respectively from the plant. The power is to be used in and around Los Angeles. The Pacific Gas & Electric Company has placed an order with the Westinghouse Company for four waterwheel-type generators of large capacity to be used in the San Francisco district.

Brown, Williams, Bell, Hanson & Boettcher, 1550 Monadnock Block, Chicago, Ill., will hereafter carry on the practice of patent and trademark law heretofore conducted by Brown & Williams. Albert C. Bell, Harvey L. Hanson and Arthur H. Boettcher, the new partners now associated with Charles A. Brown and Lynn A. Williams, have for years been actively associated with the firm. Mr. Bell is a graduate of Cornell University in electrical and mechanical engineering, and was for several years in charge of the patent department of the Stromberg-Carlson Telephone Manufacturing Company. Mr. Hanson has had a varied experience in the more general practice of law in his many years association with Mr. Brown in patent and trademark matters. Mr. Boettcher, since finishing his training in the engineering department of the University of Wisconsin, has devoted himself exclusively to the practice of patent and trademark law.

Leeds & Northrup Company, 4901 Stenton Avenue, Philadelphia, Pa., has issued catalog No. 60 describing Reichanstalt precision photometers and accessories and other apparatus for photometric work. This company has spent a great deal of time and work in redesigning this apparatus and the equipment is believed to be now thoroughly satisfactory. The photometer tracks are made of cold-rolled straight steel shafts supported upon castings and placed accurately parallel to one another. Means is provided for leveling and for fastening the track to the table. The scale is accurately divided upon brass by white divisions on a black background. The observing carriage is made to take the firm's Lummer-Brodhun and Bunsen screens, but another type of screen can be used with a suitable supporting standard. The carriage is produced from accurately made jigs, insuring proper alinement, and a vertical adjustment is provided. A small lamp is provided for the index to illuminate the scale. Other accessories include a lamp receptacle, whose socket is provided with a split shell, a compound rotator, rotating sector, screens, rheostats and potentiometer. Prices are given in the catalog of the photometer and of all accessories.

Record of Electrical Patents.

Issued by the United States Patent Office, October 22, 1912.

Patents Issued October 22, 1912.

1,041,718. Telegraphic Relay. H. J. Archer, Chicago, Ill. The armature of the electromagnet carries a weight.

1,041,720. Automatic Flatiron. H. P. Ball, assignor to General Electric Co. Rotation of the handle in opposite directions actuates a snap switch to close or open the circuit.

1,041,728. Means for Preventing Theft of Current from Electric Meters. C. F. Bertig, Winsted, Conn. The meter connecting wires are protected by tubes and disk barriers.

1,041,752. Arc-Light Electrode and Method of Making the Same. J. T. H. Dempster, assignor to General Electric Co. Before shaping the magnetite electrodes red oxide of iron is mixed into the paste.

1,041,771. Electric Clock. H. T. Gay, assignor of one-half to J. G. Hochrein and one-fourth to J. F. Carroll, Baltimore, Md. The circuit is opened and closed by a disk that is operated by a pawl and ratchet.

1,041,778. Welding Apparatus. J. H. Gravell, assignor to Hale & Kilburn Co., Philadelphia, Pa. Includes two transformers, each with a pair of secondary welding terminals, the two secondaries being in series.

1,041,782. Electric Motor or Generator. E. A. Halbleib, assignor to Northeast Electric Co., Rochester, N. Y. Relates to the commutator and brush construction.

1,041,790. Process for Electrolytic Cleansing. A. Herrmann, Leipzig, Germany. Wire, metal type or sheet and fabric are cleansed by being passed as anode through an electrolytic bath and subjected to high current density.

1,041,817. Metallic-Filament Lamp. O. Krause, assignor to General Electric Co. Electric springs support the filament holder on the lamp stem.

1,041,835. Spark Plug. J. J. McIntyre, Hartford, Conn. Includes a yielding bushing.

1,041,845. Motor-Control System. E. J. Murphy and J. Eaton, assignors to General Electric Co. Provides for dynamic braking by short-circuiting the armature of a reversible motor.

1,041,846 and 1,041,847. Electric Cutout. T. E. Murray, New York. Includes a plug carrying a fuse strip looped around a partition. The second patent covers a similar gang plug.

1,041,859. Motor-Controlling Device. T. W. Nowell, assignor to General Electric Co. Provides a special detent for the controller arm.

1,041,866. Street Sign. S. L. Phillips, Denver, Colo. Includes an electric lamp for illuminating internally a pair of street-corner signs.

1,041,867. Driving of Rail and Like Vehicles. H. Pieper, Liege Belgium. A motor-generator set driven by a gasoline engine is flexibly connected to one axle of each truck.

1,041,868. Alternating-Current-Motor Control. W. B. Potter, assignor to General Electric Co. A compensated series motor has the armature short-circuited at low speeds.

1,041,888.—Outlet-Box Bushing.

1,041,873. Electric Lamp Socket. W. A. Richardson, assignor of one-half to J. G. Barrett and one-half to E. M. Kennealy, Chicago, Ill. The wires enter at the side of the socket; a spring button closes the circuit on depression through the end cap.

1,041,888. Outlet-Box Bushing. P. C. Schorr, St. Paul, Minn. Threaded on the end of the conduit are two bushings engaging the outside and inside of the box; the inner bushing has a flange on which is a conduit-closing cap.

1,041,918. Junction-Box Cover. C. Wagner, Brooklyn, N. Y., assignor to Sterling Bronze Co. The cover bears a threaded pin whose nut has catch-pins engaging recesses in reversible plates.

1,041,929. Trolley-Switch Mechanism. O. H. West, Gary, Ind. Is controlled by throwing the track switch of a turnout.

1,041,937. Insulating Bracket. D. W. Wyche, Marquez, Tex. Consists of a pair of members pivoted together so as to clamp part of the insulator between them.

1,041,943. Electric Bell or Ringer. C. R. Albertus, Chicago, Ill., assignor to American Electric Co. Provides alined micrometer screws for adjusting the two bells of a telephone ringer.

1,041,965. Party-Line Telephone System. H. P. Clausen, Chicago, Ill., assignor to American Electric Co. Relates to a line relay and line signal.

1,041,966. Circuit-Make-and-Break Device for Railway-Signaling Systems. W. J. Cook, assignor to Cook Railway Signal Co., Denver, Colo. Pivoted arms on each side of the track close signal circuits when depressed by the train.

1,041,982. Current-Controller. G. B. Dusinberre, assignor to Allen-Bradley Co., Milwaukee, Wis. Connected with each switch arm is a spring applying pressure to a compression resistance.

1,041,988. Railroad Signal. A. H. Fargo, Newark, N. J. The semaphore arm carries a vacuum tube outlining its form and continually illuminated.

1,042,008. Automatic Pressure-Regulator. H. W. Kimes, assignor to Vaile & Kimes Co., Dayton, O. Includes a pressure-actuated circuit-breaker and closer.

1,042,019. Insulating Joint. L. McCarthy, Boston, Mass. Has insulation between and around the ends of two flanged stems and a double shell around the whole.

1,042,028. Railway-Signaling Device. J. W. Page, Quitman, Ark. A remote-controlled electric motor drives a lamp-signal-obscuring flag.

1,042,058. Massage Apparatus. K. Van Hook, Hiawatha, Kans. An electric motor vibrates a diaphragm through an eccentric and connecting rod.

1,042,069. Method of and Apparatus for Relaying High-Frequency Currents. E. F. W. Alexanderson, assignor to General Electric Co. A relay of wireless signals includes a mercury-vapor

tube on which is impressed a pulsating current in step with the exciting pulsations.

1,042,096. Electrical Signalling System. H. M. Eldred, Milwaukee, Wis. Includes a master and secondary clocks, selector and bell relays and a signal-controlling cylinder.

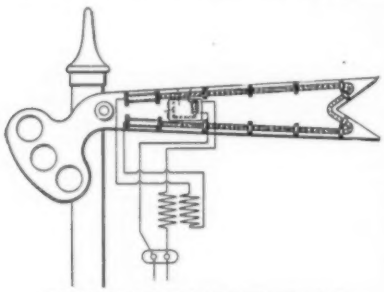
1,042,103. Switch-Locking Mechanism. T. M. Freeble, Rochester, Pa., assignor of one-half to R. M. Kaufmann. An electromagnet controls the key for a track switch.

1,042,109. X-Ray Tube. H. Green, Hartford, Conn. Has a third electrode near the anode.

1,042,111. Method for Producing So-Called Porous Metals. H. I. Hannover, Copenhagen, Denmark. Porous storage-battery plates are produced from lead and antimony alloy, which is heated till the eutectic alloy fuses; the latter is then mechanically driven out of the remaining solid plate.

1,042,122. Magnetic Speedometer. H. Kocourek, assignor to Stewart & Clark Manufacturing Co., Chicago, Ill. Includes a rotatable circular magnet and a drag disk.

1,042,130. Electric Controlling Device. H. W. Leonard, Bronxville, N. Y. A motor starter and rouser includes an automatic resistance-controlling switch and a non-automatic reversing switch.



1,041,988.—Electrically Illuminated Semaphore.

1,042,150. Supporting Mechanism. A. Scheible, Chicago, Ill. A street-lamp hanger including a sheave and housing therefor, the latter having ribs for guiding the rope and a seat for supporting the lamp independent of the rope.

1,042,153. Trolley Catcher and Replacer. W. J. Scrimshaw, Chicago, Ill. On each side of the wheel is a pivoted fork arranged to guide the wire to the wheel.

1,042,156. Heater for Steering Devices for Motor-Driven Vehicles. E. D. Shannon, Alpena, Mich. The steering wheel is hollow and contains adjustable miniature electric lamps as heaters.

1,042,162. Trolley. F. Slonowski, Marianna, Pa. Has a guide arm on each side of the wheel.

1,042,179. Process and Furnace for Producing Gas Reactions. O. H. Weber and K. Weber, assignors to Chemische Fabrik Griesheim Elektron, Frankfort-on-the-Main, and O. Dieffenbach and W. Moldenhauer, Darmstadt, Germany. The gas is fed to an electric arc of which the lower electrode is a column of granular carbon continually pushed upward.

1,042,183. Polarized Relay. J. L. Woodbridge, Philadelphia, Pa. Includes three magnetic circuits, one of which is readily saturated so as to limit the reversed flux.

1,042,186. Circuit-Breaker. C. Ambruster, Chicago, Ill. Has special means for adjusting the weight of the tripping armature.

1,042,188. Adjustable Telephone-Instrument-Locking Device. C. H. Bard, Mount Vernon, N. Y. A locking band prevents the switchhook from being raised.

1,042,191. Egg-Tester. W. D. Bixler, Fort Worth, Texas, assignor of one-half to W. Schmidt. Includes dry cells, a small lamp and a reflector, all housed in a casing.

1,042,199. Wire Clamp. H. L. Carroll Gassaway, W. Va. Consists of a resilient loop and a catch lever to secure a line wire to an insulator.

1,042,205. System of Duplex Wireless Transmission. L. de Forest, New York, N. Y. In each of the two legs of the antenna circuit are two coils associated respectively with the transmitting and receiving circuits.

1,042,212. Limit-Switch for Elevators or Hoisting Machinery. H. W. Forslund, assignor to J. W. Reedy Elevator Manufacturing Co., Chicago, Ill. Cuts off the motor current when the car approaches the end of its travel.

1,042,228. Plug Switch. C. Horn, assignor to Machen & Mayer Electrical Manufacturing Co., Philadelphia, Pa. The plug has blades adapted to be thrust into the terminal chambers.

1,042,244. Alarm. A. L. Macklin, Bryant, Ind. Includes a thermostatically controlled electric alarm circuit.

1,042,304. Electrical Bonding Device. H. C. Williams, Utica, N. Y., assignor of one-third to F. B. Harrington, and one-third to S. R. Payne. The ends of the bond wires are held by plates that are wedged between the head and base of the rail.

1,042,316. Speed Indicator. F. L. Cantrall, Ivy, Cal. Part of an automobile wind shield is divided into sections, each bearing a number and an electric lamp, the latter connected to contacts on a speed dial.

1,042,319. Shoe-Branding Machine. E. N. Chandler, assignor to Simplex Electric Heating Co., Boston Mass. Includes electric heating elements.

1,042,348. Electric Attachment Plug. M. Herskovitz, Chicago, Ill., assignor of one-half to C. W. Henger. A separable plug, with a yielding sleeve and groove separated by an abnormal pull.

1,042,372. Split Insulator. J. R. Harris, Allegheny county, Pa. The base has a central bore into which fits the stem of the cap.

1,042,375. Electric-Arc Lamp. W. Ruhling, assignor to H. Malachowski, Berlin, Germany. Parallel electrodes are mounted on the base and separated by a heat-resisting non-conductor adapted to extinguish the lamp by lengthening the arc.

Patents That Have Expired.

Following is a list of electrical patents (issued by the United States Patent Office) that expired October 29, 1912.

548,627. Electric Traction. E. Chareault, Marseilles, France.

548,682 and 548,683. Electric Arc Lamp. M. Wheless, Washington, D. C.

548,684. Dynamo-Electric Machine. N. Whichello, Chicago, Ill.

548,700. Electrical Recording Apparatus. A. C. Crehore, Hanover, N. H.

548,701. Indicator for Electric Currents. A. C. Crehore.

548,709. Polyphase Motor. F. S. Hunting, Fort Wayne, Ind.

548,729. Telautograph. G. S. Tiffany, Highland Park, Ill.

548,730. Dry Battery. J. T. Todd, Tuscola, Ill.

548,744. Electric Switch. J. C. Cassidy, East Orange, N. J.

548,755. Electric Meter. R. O. Hood, Danvers, Mass.

548,777. Electrode for Applying Electric Currents. E. F. Davis, West Caton, N. Y.

548,786. Underground Electric Railway. H. B. Nichols and F. H. Lincoln, Philadelphia, Pa.

548,789. Distribution System for Alternating Currents. A. L. Searles, Brooklyn, N. Y.

548,819. Electric Switch. H. Ross, Providence, R. I.

548,829. Device for Regulating Current Admitted to Electric Motors. F. E. Herdman, Winnetka, Ill.

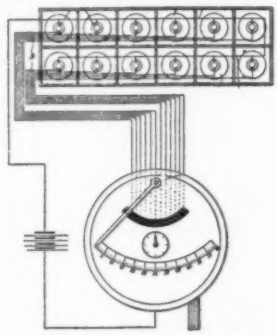
548,830. Automatically Controlling Electric Motors. F. E. Herdman.

548,867. Rheostat Element. H. P. Davis, Pittsburgh, Pa.

548,897. Telephone Switch. J. E. Thomas, Cleveland, O.

548,899. Adjustable Incandescent-Lamp Holder. E. Wade, Lawrence, Mass.

548,904. Automatic Time Cutout. F. B. Badt, Chicago, Ill.



1,042,316.—Automobile Speed Indicators.

548,924. Electric Train Signal. M. W. Parrish, Detroit, Mich.

548,930. Turbine Electric Generator. C. E. Sargent, Chicago, Ill.

548,949. Safety and Limit Switch for Electric Motors. G. F. Card, Mansfield, O.

548,952. Electric Brake. F. E. Case, Schenectady, N. Y.

548,968. Automatic Circuit-Breaker Alarm. J. H. Devine, Johnstown, Pa.

548,969. Telegraph Instrument. O. A. Dickinson, Arverne, N. Y.

548,976. Closed-Conduit Electric Railway. M. F. Flynn, Stamford, Conn.

548,997. Electric Motor-Car Trolley. J. M. Kennedy, Holidaysburg, Pa.

549,023. Secondary-Battery Plate and Method of Preparing It. J. J. Rooney, Brooklyn, N. Y.

549,038. Electric Program Clock. L. H. Watters, Media, Pa.

549,045. Electric Burglar Alarm. M. Anthony, Streator, Ill.

549,061. Indirect Control of Motors. G. S. Dunn, New York, N. Y.

549,074 and 549,075. Electric Arc Lamp. R. Niewerth and H. Niewerth, Berlin, Germany.

549,079. Secondary-Battery Grid and Plate and Method of Preparing Grids. J. J. Rooney, Brooklyn, N. Y.

549,083. Electric Arc Lamp. M. Wheless, Washington, D. C.

549,091. Trolley for Electric Railways. J. Ness, Scranton, Pa.